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**WORK PLAN
NAPLES TRUCK STOP GASOLINE SPILL
NAPLES, UTAH**

OPA

**Contract No. DACW45-90-D-9002
Delivery Order No. 88
IT Project No. 519063**

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JULY 1994

FILE PLAN
99.09.01

Draft

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1.0 Introduction

The following Work Plan (WP) has been prepared by IT Corporation (IT) for the U.S. Army Corps of Engineers (USACE) Omaha District, in compliance with Rapid Response Contract No. DACW45-90-D-9002, Delivery Order No. 88, based upon USACE's Scope of Services dated July 13, 1994.

The plan addresses the completion of the Immediate Response Action initiated to remove unleaded gasoline which originated from a release at the Naples Truck Stop in Naples, Utah. The additional tasks required include the construction of a concrete block building to house the remediation equipment, the installation of a second enhanced soil vapor extraction unit, the operation of a bioremediation treatment system (or alternate treatment method, if required), the installation of several vadose zone monitoring points, operation and maintenance (O&M) of the entire system, the preparation of an O&M manual for future use, and additional associated tasks. The location of the recovery and treatment operations is located on the Questar Pipeline property.

The specific activities include the following:

- The design and procurement of the permanent extraction system including the additional piping required
- The design of the concrete block building required to house the extraction and treatment equipment.
- The construction of the system building, the installation of the proposed extraction unit and piping, and retrofitting of the existing extraction unit to fit the final design.
- The installation of six vadose zone monitoring points to be used in evaluating the system performance.
- The characterization of the northeast corner of the Naples Truck Stop property.
- The operation of a biological treatment system (or alternative system) to treat the extracted air and water streams.
- The O&M of the entire extraction and treatment system for a period of 90 days following acceptance.

- The preparation of an O&M manual to be utilized for the duration of the remediation.
- The sampling and analysis required to evaluate the performance of the system during the 90-day O&M period.

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2.0 Phase I Activities

2.1 Site Visit/Assessment

IT was requested to provide assistance to the USACE under the Rapid Response contract on March 2, 1994 to assess the impact of an unleaded gasoline release from the Naples Truck Stop in Naples, Utah. Representatives of the USACE Omaha District, the U.S. Environmental Protection Agency (EPA), and IT met at the site to discuss the project and to begin immediate remedial action.

Due to the migration of the plume toward the operations building of Questar Pipeline, immediate action was required. Questar Pipeline had already begun to install a cutoff trench across their property and the installation of a biological treatment system to treat ~~any~~ product which would be recovered. Once the local hydrogeologic data was evaluated, the ~~interceptor~~ trench concept was halted and alternate extraction methods initiated.

The initial steps taken to further evaluate the site and to begin remedial action included the installation of monitoring wells and recovery wells, the performance of a pump test to evaluate the aquifer characteristics, the removal of the existing interceptor trench piping and backfilling of the trench, the installation of additional recovery wells based on the pump test data, and the installation of a vacuum ~~pumping~~ system to begin recovering product. The recovered groundwater and product was treated utilizing a trailer-mounted air stripper. The details of the Phase I activities are further described in the following sections.

2.2 Recovery/Monitoring Well Installation

With the first round of IT well installation, three monitoring wells and six recovery wells were installed in the plume area just upgradient of Questar Pipeline's office building. The monitoring wells were installed for the purpose of collecting data for the aquifer test and determining subsurface conditions. The recovery wells were located to optimally capture, as part of an interim vacuum enhanced pumping (VEP) capture system, the leading edge and downgradient portions of the plume. After examination of the pumping test results and the contaminant data collected by EPA's Technical Assistance Team (TAT), four additional recovery wells and two more monitoring wells were installed. Figure 1 is a site plan which shows the location of all monitoring wells and recovery wells. Two of the additional recovery wells were placed east of Questar Pipeline's office building (Recovery Wells RW-7

and RW-8) to capture the leading edge of the contaminant plume. The other two were placed on Naples Truck Stop (Recovery Wells RW-9 and RW-10) to speed up capture of the central portion of the plume.

2.2.1 Monitoring Well Installation/Development Procedures

Appendix A presents the well completion diagrams and boring logs for the monitoring wells installed by IT. Monitoring Wells MW-11, MW-12, and MW-13 are constructed of 2-inch-diameter polyvinyl chloride (PVC). Monitoring Wells MW-14 and MW-15 are constructed of 4-inch PVC. The 2-inch PVC wells were developed by bailing approximately 6 gallons from each monitoring well. The 4-inch PVC wells were developed by bailing approximately 45 gallons from each monitoring well. Monitoring Wells MW-11 and MW-12 had a substantial amount of silt in the bottom which was removed during bailing. Monitoring Wells MW-11 and MW-12 were bailed continuously without going dry. Monitoring Wells MW-14 and MW-15 were bailed continuously without going dry, but did exhibit signs of drawdown during bailing. Monitoring Well MW-13 was bailed dry and required about 20 minutes to recover.

2.2.2 Recovery Well Installation/Development Procedures

Recovery Well RW-1 is constructed with 6-inch stainless steel. The remaining recovery wells are constructed of 4-inch-diameter PVC. Recovery wells were developed by bailing from 25 to 45 gallons of water from each recovery well. Development water from the wells remained slightly turbid for all wells at the end of the development. Recovery Well RW-3 bailed dry and required about 20 minutes to recover. Recovery Wells RW-5, RW-7, RW-8, and RW-10 bailed down, but did not go completely dry. The remaining recovery wells bailed without measurable a drop in the water surface.

2.3 Recovery Trench Closure

The recovery trench which traversed the Questar Pipeline property was required to be backfilled to the original ground surface elevation prior to the execution of the VEP pilot test. This trench was about 50 percent installed when the decision was made to abandon this method of extraction. This design called for a trench 10-feet deep by 2-feet wide with a 12-inch-diameter perforated pipe placed along the bottom. The trench was then to be filled with coarse gravel to allow for the influx of groundwater and product. Extraction sumps were also planned for installation at several locations along the trench.

In order to backfill the trench, the existing gravel and pipe was removed using a backhoe and placed in a truck for transport to the soil holding area located in Questar Pipeline's adjacent pipe storage yard. Once the gravel was removed, the soil originally excavated from the trench was placed back in the trench and compacted with the backhoe bucket. Due to the high groundwater elevation and unstable nature of the trench sidewalls, alternative compaction methods were unsuccessful.

Once the trenches were backfilled to within approximately three feet of the surface, road base material was obtained from off-site sources and placed in the trench. This material was well compacted using a plate compactor and leveled with the bottom of the existing asphalt layer.

The lack of operational asphalt plants in the area due to seasonal conditions at the time of this work required an alternative method of temporarily sealing the voids in the asphalt so as not to negatively affect the VEP pilot test results. The decision was made to place 6 mil plastic sheeting over the open asphalt areas and cover the entire sheeting with gravel, creating a seal along the edges of the asphalt cuts. This procedure was also followed in several other areas at the site where excavating activities had taken place. This method was designed only as a temporary measure, and the asphalt is to be restored as soon as possible.

2.4 VEP Pilot Test

On March 25 and 26, 1994, IT personnel conducted a VEP pilot test on Recovery Well RW-1. The purpose of this test was to assess the aquifer characteristics/soil permeability of the study area, and determine the feasibility of using this particular technology for the recovery of petroleum product as well as long term restoration of impacted soils and groundwater at the site. The following section describes the pilot test procedures.

2.4.1 VEP Pilot Test Procedures

The pilot test was performed on Recovery Well RW-1, which is constructed of six-inch-diameter stainless steel pipe and extends to a total depth of 17 feet. Monitoring Wells MW-5, MW-8, MW-11, MW-12, and Recovery Well RW-2 were utilized as vacuum and groundwater monitoring points. Vacuum readings were collected from these wells using a hand-held electronic digital manometer. The test was operated to determine the optimal vacuum and vapor flow rate required to achieve the maximum groundwater and soil vapor recovery rates.

Extracted groundwater collected during the pilot test was treated by IT's portable air stripping unit.

Prior to running the pilot test, groundwater level measurements were collected manually and by pressure transducers. The Hermit 2000B data logger system utilizing five pressure transducers placed in Monitoring Wells MW-5, MW-8, MW-11, MW-12, and Recovery Well RW-2 was set up prior to conducting the test. Manual and transducer groundwater level data were used to determine static conditions. During the VEP pilot test, the Hermit 2000B data logger was programmed to collect data at 15-minute intervals throughout the test. The VEP pilot test was conducted for 24 hours. During the test, manual water level measurements were also collected in Monitoring Well MW-1. These measurements were used to evaluate potential fluctuations in the water table in an area outside the influence of the pilot test.

2.5 Evaluation of VEP Pilot Test Data and Site Characteristics

2.5.1 VEP Pilot Test Results

Based on review of the data collected during the pilot test, it appears that two different conductivity areas exist in the water table at the site. The lowest area of conductivity was measured in the south southwestern direction from Recovery Well RW-1 to Monitoring Well MW-5. The highest conductivity area was measured in the southeastern direction from Recovery Well RW-1 to Recovery Well RW-2. Hydraulic conductivity values were calculated from the pilot test which show a K value of 17 feet per day (ft/d) in the low conductivity area and a K value of 39 ft/d in the high conductivity area.

The method used in the field to analyze the pumping/drawdown data generated during the VEP pilot test was the Hantush Jacob (1955) Curve Math Method in a software package by In-Situ titled HJ-Match (1987). A second software package by Geraghty and Miller, AQTESOLV, which utilizes the Theis or Cooper-Jacob Methods with the Jacob's correction for reduced saturated thickness for unconfined aquifers, was used to verify the conductivities calculated in the field. The results of both techniques are presented in Appendix B of the Interim Product Collection and Treatment System Summary Report prepared by IT, dated April 1994. The mathematical summaries presented in the report define the aquifer characteristics in the form of transmissivity. Hydraulic conductivity can be calculated from

this by dividing transmissivity by aquifer thickness. VEP enhances this by adding an additional potential drawdown to saturated thickness in the form of a negative drawdown.

Vacuum effect was only detected in Recovery Well RW-2 as 1.6 inches of water. The remaining four monitoring points did not indicate any detectable vacuum influence. Several reasons exist for the lack of vacuum measured in all radial directions from the extraction well. Monitoring wells screened in the saturated zone only would require groundwater drawdown to be below the top of the screen in order to expose the unsaturated zone to the vacuum. The presence of a higher conductivity area will channel vacuum-effected air flow through the path of least resistance. After review of data collected to date, it appears that a combination of both factors may be effecting the test results. This data does suggest; however, that both groundwater and soil vapor are readily available for extraction purposes. Operating parameters collected during the VEP pilot test for Recovery Well RW-1 were included in the Interim Product Collection and Treatment System Summary Report.

The pilot system operated for 24 hours and recovered 3,457 gallons of groundwater for an average groundwater flow rate of 2.4 gallons per minute (gpm). Based on this flow rate and groundwater analytical results obtained from the influent to the air stripping system, 0.028 pounds per hour of total benzene, toluene, ethyl benzene, and xylene (BTEX), or gasoline, were removed through the groundwater treatment system. Hydrocarbon removal rate calculations were included in the Interim Product Collection and Treatment System Summary Report. Additionally, two soil vapor samples were collected approximately 12 hours and 23 hours after beginning the test. The two analytical results indicate that between 591 parts per million (ppm) and 630 ppm were extracted through the soil vapor at any given time, for an average of 610 ppm for the entire test. Using a mass balance equation, the average amount of BTEX removed from the air stream during the pilot test equates to 0.190 pounds per hour. An average soil vapor flow rate of 24 standard cubic feet per minute (scfm) was measured throughout the test.

2.5.2 Site Geology and Hydrogeology

During the drilling of on-site monitoring wells, it was determined that the soil beneath the site consisted of silty-clay to approximately 10 feet below land surface. At approximately 10 to 11 feet, a cobble layer was encountered extending a foot or so in depth. Beneath the cobble layer, a silty-clay with scattered cobbles was encountered ranging in thickness of 6 to 10 feet.

Shale bedrock underlain the silty-clay at a depth ranging from 16 to 20 feet below land surface. Groundwater was encountered approximately 6 feet below grade.

Based on field observation during drilling, pilot test, groundwater monitoring, and sampling activities, there appears to be a higher conductivity area (possible former stream channel) centered through the parking lot of the Questar Pipeline property. This theory has been supported by the flow rates encountered in certain extraction wells across the facility during interim remedial actions. Recovery Wells RW-2, RW-4, and RW-5 yielded higher flow rates during VEP than other nearby recovery wells. The free product observed at the site appears to be smeared in the uppermost silty-clay layer and has shown no downward migration due to density differences between the groundwater and product. In addition, the cobble layer appears to be acting as a conduit for the migration of dissolved hydrocarbons in a downgradient direction.

2.5.3 Groundwater Monitoring

Groundwater level and product thickness measurements were collected from monitoring wells at the site on March 24, 1994. The measurements represent static conditions since they were collected prior to the aquifer or VEP testing activities. Product was detected in Monitoring Wells MW-5 and MW-8 during this monitoring event. Water table elevations are based on a 100-foot, site-specific base line elevation and not mean sea level. Based on the March 24, 1994 monitoring data, groundwater flow in the water table is to the southeast (Interim Product Collection and Treatment System Summary Report prepared by IT, dated April 1994).

2.5.4 Hydrocarbon Plume

The EPA's TAT completed an extensive assessment of Naples Truck Stop and surrounding properties in February 1994. This work consisted of installing groundwater monitoring wells, soil vapor survey, hydropunch survey, and sampling of monitoring wells. In addition, IT also completed a limited assessment activity at the site from March to July 1994. This work consisted of the installation of recovery wells and monitoring wells, and various groundwater sampling events. Groundwater analytical results collected by the EPA's TAT reveal the areal extent of the hydrocarbon plume extends from the Naples Truck Stop property to the southeast corner of the Questar Pipeline property (Figure 2). Through various sampling events conducted by IT and the EPA's TAT, the hydrocarbon plume has been defined to the

north by MWC-3; to the east by NGMW-06 and NGMW-01; to the southeast by NGMW-07, MW-14, and MW-15; to the south by NGMW-03 and NGMW-04; and to the west by NGMW-05. A summary of all the groundwater analytical collected by IT can be found in Table 1. A summary of the analytical results collected by Richards Laboratories can be found in Table 2.

2.6 Interim Remedial Action

The interim recovery system, which had been installed in March 1994, used the combination of groundwater and soil vapor extraction recovery wells fitted with 1.5-inch-diameter drop tubes inserted to the base of the extraction well screen. A 20-horsepower, oil-sealed, diesel-powered, vacuum pump applied approximately 10 inches of mercury to each wellhead to simultaneously remove hydrocarbon-affected water and volatile hydrocarbons as a ~~residuum~~ within the unsaturated soils. Each individual 1.5-inch line leading from the recovery wells to the main influent line is equipped with a gate valve, pressure gauge, and threaded sample port.

The main influent line directs the recovered water and air stream into a water/vapor separator. From the separator, the water is pumped to an oil/water separator tank. Recovered separate-phase hydrocarbons is collected in an aboveground holding tank to await proper disposal. Water containing dissolved hydrocarbons is transported from the oil/water separator into an air stripping system. Finally, treated water is transported to the sanitary sewer for discharge. The vapors separated from the groundwater in the water/vapor separator are routed separately to atmospheric discharge. A site plan which depicts the interim remedial system layout has been included as Figure 3.

During the first month of initial remedial action, Recovery Wells RW-1, RW-2, RW-3, RW-4, and RW-6 were utilized as extraction wells. Due to changing site conditions and vacuum pump performance, IT personnel turned off Recovery Well RW-6 on May 3, 1994.

Richards Laboratories conducted a limited bioremediation pilot test on May 4, 1994. The water effluent from the vacuum unit was re-routed from the air stripper to the biosystem. At the time of the pilot test, Richards Laboratories was not able to accept the air stream flow into the biosystem. Results from the biopilot test proved to be inconclusive since Richards Laboratories' equipment could only handle a limited flow rate (approximately 3 to 5 gpm)

and the air effluent from the vacuum unit was not discharged into the biosystem. Once the biopilot test was completed, the water effluent from the vacuum pump was routed back into the air stripper.

On May 11, 1994, the 500-gallon aboveground diesel fuel tank exploded and the vacuum pump caught fire. The remedial system was down until the second week in June 1994, while a new electric powered pump could be acquired. Three-phase, 480-volt and 240-volt power was brought in to supply the energy needed to run the vacuum pump(s). The electric vacuum pump that replaced the diesel unit (System 1) is a 15-horsepower, three-phase, 240-volt, liquid-ring vacuum blower capable of 29 inches of mercury and an air flow rate of 225 scfm. Once the system was restarted, extraction wells RW-1 through RW-6 were brought on line. This remediation system is currently in operation.

2.6.1 Remediation Data

The system is currently pumping groundwater from extraction wells RW-1 through RW-6 at a flow rate of 15 to 22 gpm. The average air flow rate from the air stream effluent is approximately 25 scfm. As of March 25, 1994, over 1,200,000 gallons of groundwater have been treated by the air stripper system to date. The hydrocarbon loading rates (air and water) and effluent discharge parameters (air and water) have been closely monitored by IT. According to the analytical results collected at the site, approximately 2,400 pounds of hydrocarbons have been removed from the subsurface to date. Air effluent samples for BTEX constituents have been collected once per month since system startup (Table 3). Also, groundwater influent and effluent samples from the air stripper system have been collected once per month and analyzed for BTEX and total petroleum hydrocarbons (TPH) (Table 4).

2.7 Site Survey

A site survey was conducted in order to provide an accurate layout of the well locations, well casings, elevations, and to assist in the final design of the remedial system. This survey will also be useful for the future operators of the treatment system to monitor the containment and cleanup of the plume.

The survey details the location and elevation of all wells associated with this site, the property corners, building locations, and other pertinent information. Two permanent control monuments were also installed and located as part of this survey. The completed survey has

not been drafted at the time of submittal of this report. The completed documentation will be supplied as soon as it becomes available.

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3.0 Phase II Activities

3.1 Plan Preparation

The efforts incorporated in the various plan preparations are in response to the predelivery notice, predelivery order, site visit, Phase I activities, USACE Scope of Services, and various discussions with the USACE Omaha District and IT personnel.

The work performed under this task includes the preparation of the plans as required by the Scope of Services, Section 8.1. These plans are as follows:

- Project WP
- Site Safety and Health Plan (SSHP) (Appendix D)
- Contractor's Sampling and Analysis Plan (CSAP).

All the plans listed above will be submitted as sections within this WP. All plans will be reviewed and approved by the USACE prior to the start of on-site activities. Revisions and resubmittals will be made as necessary.

3.2 Design of Permanent Extraction System

The remedial design is based upon a number of factors including site access, hydrocarbon constituents and concentrations, subsurface hydrogeologic conditions, permissible atmospheric emissions, treated groundwater effluent requirements, and results from the interim remedial actions. The location of the remedial components and piping layout are illustrated in Figure 4. The major components of the remedial system will be enclosed within a weatherproofed equipment building.

3.2.1 Recovery Wells

To withdraw groundwater containing dissolved/separate-phase hydrocarbons from the subsurface, ten recovery wells, labeled RW-1 through RW-10, have been positioned within the areas of the greatest hydrocarbon concentrations and on the leading edge of the plume. Recovery Well RW-1 is a 6-inch-diameter steel recovery well, while Recovery Wells RW-2 through RW-10 are 4-inches in diameter. Recovery Wells RW-2 through RW-6 are constructed of 10.0 feet of 0.02-inch slotted PVC screen and solid PVC riser. Recovery Wells RW-7 through RW-10 are constructed of 15 feet of 0.02-inch slotted PVC screen and

solid PVC riser. Total depth of these recovery wells range below land surface from 16 to 19 feet, with the top of the casings set approximately 1 to 2 feet below grade.

Based upon an examination of the boring logs completed during the installation of monitoring wells, the annular space between the borehole wall and the well screen are packed with 10/20 grade silica sand to reduce the potential for clogging of the well screen. The recovery wells have been or will be completed below grade and housed in a steel manhole assembly.

During dual vacuum extraction operations, groundwater recovery rates are increased approximately three times greater than conventional pumping methods due to the negative pressure gradient in the well vicinity. The negative pressure gradient helps overcome the capillary forces which tend to hold the water trapped in the soil voids. Based on the data collected during the VEP pilot test and the interim remedial actions completed to date, an expected 20 to 25 gpm will be extracted from Recovery Wells RW-1 through RW-6; an expected 5 to 10 gpm will be extracted from Recovery Wells RW-7 and RW-8; and an additional 10 to 15 gpm may be extracted from Recovery Wells RW-9 and RW-10. Hence, the total maximum flow of the system at a given point in time ranges from 35 to 50 gpm. The estimated flow rates for Recovery Wells RW-7 through RW-10 are based on observations noted during well purging and developing procedures.

An 80-foot cone of influence from the extraction well was observed during the pumping test. However, due to hydraulic conductivity differences within the subsurface, this cone of influence induced on the water table was not radially symmetrical.

3.2.2 Piping

The combined groundwater and soil vapor extraction recovery wells which have been recently installed will be fitted with 1.5-inch-diameter, high-density polypropylene (HDP) drop tubes which are inserted to the base of the extraction well screen. A vacuum is applied to the tube to simultaneously remove hydrocarbon-affected water and volatile hydrocarbons as a residuum within the unsaturated soils. Each individual 1.5-inch HDP line leading from the recovery wells will be equipped with a gate valve, pressure gauge, and threaded sample port. At the extraction wellheads, the 1.5-inch HDP line will be coupled to a 3-inch-diameter Schedule 40 PVC piping back to the vacuum extraction units. To minimize vacuum loss through the

pipng and achieve optimal performance from the two vacuum units, four branches of piping run will be used as follows:

- Recovery Wells RW-1 through RW-3, which have been piped in series to the existing vacuum unit, will be manifolded with flows from Recovery Wells RW-7 and RW-8. Each branch of piping will be fitted with gate valves to control flow and vacuum pressures. This will allow for greater flexibility should on-site conditions change.
- Recovery Wells RW-4 through RW-6 will be disconnected from Recovery Wells RW-1 through RW-3 and piped in series to the proposed vacuum unit where it will be manifolded with flow from Recovery Wells RW-9 and RW-10. Each branch of piping will be fitted with gate valves to control flow and vacuum pressures.

Two main influent lines will direct the water and air stream into a water/vapor separator. From the separator, the water containing dissolved hydrocarbons will be pumped into the biosystem or the air stripping system. Finally, treated water will be pumped to the sanitary sewer system. The vapors separated from the groundwater in the water/vapor separator are routed separately to be treated prior to discharge.

3.2.3 Master Control Panel

The treatment VEP systems will require a master control panel to supply electrical power. The control panel will be located outside the equipment building and will ultimately operate and control all functions of the recovery and treatment systems. The control panel, to be supplied by NEPCCO with the proposed skid-mounted VEP unit, will be configured to control the proposed and the existing VEP units. The control panel(s) mounted on the existing VEP system at the site will be removed and shipped back to NEPCCO.

The NEPCCO control panel will include wiring, terminals, relays, and intrinsic barriers to accommodate the following description:

- Wiring To and From the Existing Skid:
 - 240-volt AC, 3-phase to vacuum pump
 - 240-volt AC, 1-phase to transfer pump
 - LSH-1 to turn on transfer pump
 - LSL-1 to turn off transfer pump
 - LSL-1 to turn off vacuum and transfer pumps until reset
 - LSHH-1 to turn off vacuum and transfer pumps until reset

- TS-1 to turn off vacuum and transfer pump until reset
 - TC-1 panel mount temperature control
 - Magnetic motor starters for vacuum and transfer pumps (both vacuum units).
- Wiring To and From the Proposed Skid:
 - 480-volt AC, 3-phase to vacuum pump
 - 240-volt AC, 1-phase to transfer pump
 - LSH-2 to turn on transfer pump
 - LSL-2 to turn off transfer pump
 - LSL-2 to turn off vacuum and transfer pumps until reset
 - LSHH-2 to turn off vacuum and transfer pumps until reset
 - LSL-3 to turn off vacuum and transfer pumps until reset
 - LSHH-3 to turn off vacuum and transfer pumps until reset
 - TS-2 to turn off vacuum and transfer pump until reset
 - TC-2 panel mount temperature control.
- Other:
 - Main power disconnect
 - 5-amp ground fault circuit interrupter (GFCI) receptacle
 - Accept a set of dry contacts to shut down all four pumps
 - Provide a set of dry contacts when vacuum pump No. 1 is down
 - Provide a set of dry contacts when vacuum pump No. 2 is down.

The control panel will provide intrinsic barriers where necessary to ensure that all instruments not supplied with explosion-proof housings are intrinsically safe. Because NEPCCO supplied the first skid-mounted system, they are aware of which instruments on the first skid are affected. The panels will not be explosion proof and will; therefore, be mounted outside of the Class 1, Division 1 area.

3.3 System Component Building Construction

IT will solicit the services of a local subcontractor to construct a temporary building to house the VEP system components and the proposed treatment system. The subcontractor shall furnish all necessary labor, material, and equipment to construct a concrete block structure, 16-feet-wide by 40-feet-wide by 10-feet eave height.

All design and construction of the building shall comply with the Uniform Building Code and any local building code requirements. The subcontractor will be responsible for furnishing all necessary design drawings and calculations for USACE and IT review prior to construction.

The subcontractor will also be required to provide all necessary permits for the building construction.

The structure shall be furnished with one 4-foot mandoor and one 10-foot-wide by 8-foot-high manual overhead door. A 3-foot by 6-foot glass block light is to be supplied and installed.

The building shall be constructed of concrete masonry blocks supported on continuous spread footings. The floor slab shall be 6-inch-thick reinforced concrete. The roof system will consist of wood trusses and plywood, and all aluminum soffit and fascia and gutters. All construction shall meet the 2-hour fire rating and local building codes. In addition, the building will be equipped with proper heat, lighting, and ventilation.

The engineering design drawings and specifications were not complete at the time of submittal of this document. The drawings will be forwarded to the USACE for review as soon as they are available.

3.4 VEP System

Several different treatment technologies were evaluated for use at this facility. The VEP system was chosen at this site due to the relatively low permeability of the sediments and corresponding groundwater yield rates, and the success of the pilot test.

Two VEP units will be used to extract groundwater and vapor from four different areas at the site. The existing VEP unit will be connected via a manifold to Recovery Wells RW-1 through RW-3 located in the center of the Questar Pipeline's parking lot and Recovery Wells RW-7 and RW-8 located downgradient of the product plume. The existing VEP unit can handle flow rates up to 25 gpm. Groundwater flow from these two areas is not expected to exceed these rates.

The proposed VEP unit will withdraw groundwater and soil vapors from two different locations which typically yield higher groundwater recovery rates. The proposed VEP can handle flow rates up to 60 gpm. Recovery Wells RW-4 through RW-6, located in the southeast corner of Questar Pipeline's lot, and Recovery Wells RW-9 and RW-10, located upgradient of Questar Pipeline's lot, on Naples Truck Stop property will be manifolded into the proposed VEP unit.

By opening and closing gate valves on each individual line, as well as each manifold, vacuum requirements in each area of remediation can be controlled. This will allow for greater flexibility in balancing the system and achieving cleanup goals in each of the four concerned areas.

Two vacuum extraction pumps will be utilized to withdraw hydrocarbon-impacted water and air from ten extraction wells at this facility. Typically groundwater and air enters an air/water separator. The water will be drawn from the separator by a transfer pump and routed through an air stripper or biotreatment system for treatment purposes. The treated water will then be discharged to the sanitary sewer. The air stream is separated out and will be treated prior to discharge.

One skid-mounted vacuum pump is currently on site and operating. Vapor and groundwater flow from this existing unit is controlled by a 15-horsepower, 240-volt, three-phase power, liquid-ring, vacuum pump. According to the manufacturer's performance curve, the Atlantic Fluidics Model No. A200 can provide 225 scfm and a maximum vacuum pressure of 29 inches of mercury (Appendix B). Maximum sustained groundwater flow rate for this unit ranges from 20 to 25 gpm. The existing system is currently operating at 24 scfm at 25 inches of mercury and is removing groundwater at a flow rate of 18 gpm. Figure 5 is a process flow diagram of the existing VEP system in use at this facility. The following is a list of equipment that is included on the existing vacuum pump:

- Skid, 4 feet by 6 feet
- 1 gate valve, 1 inch
- 1 butterfly valve, 3 inches
- 1 gate valve, 1.5 inches
- 3 ball valves, 1-inch PVC
- 1 ball valve, 2 inches
- 1 check valve, 1 inch
- 1 pressure indicator, zero to 60 pounds per square inch (psi)

- 1 pressure indicator, zero to 30 inches of mercury
- 1 control panel
- 1 air/water separator, 100 gallons
- 1 liquid-ring vacuum pump, Atlantic Fluidics Model A200, 15-horsepower, 240-volt AC, 3-phase, explosion proof
- 1 transfer pump, Grundfos Model CR2-20UV, 3/4-horsepower, 240-volt AC, 1-phase, explosion proof
- 1 magnetic motor starter, open type for 15-horsepower, 240-volt AC, 3-phase, 240-volt AC coil with on-off switch legend plate
- 1 LSHH high-high level failsafe in air/water separator to turn off vacuum pump
- 1 LSH high level switch to turn on transfer pump
- 1 LSL low level switch to turn off transfer pump
- 1 TS high temperature failsafe to turn off vacuum pump.

One skid-mounted vacuum pump is proposed to remediate the areas in which greater groundwater yields may occur. Since the existing system can only handle flows upward to 25 gpm, it is expected that flow rates from other extraction wells may exceed this limitation. The proposed vacuum pump will be able to handle groundwater recovery flows upward to 60 gpm.

Vapor and groundwater flow from this proposed unit is controlled by a 15-horsepower, 480-volt, three-phase power, liquid-ring, vacuum pump. According to the manufacturer's performance curve, the Atlantic Fluidics Model No. A200 can provide 225 scfm and a maximum vacuum pressure of 29 inches of mercury. Figure 6 is a process flow diagram of the proposed VEP system that will be used for this facility. The following is a list of equipment that is included on the proposed vacuum pump:

- Skid, 4 feet by 6 feet
- 1 gate valve, 1 inch

- 1 butterfly valve, 3 inches
- 1 gate valve, 1.5 inches
- 5 ball valves, 1 PVC
- 1 ball valve, 2 inches
- 1 check valve, 1 inch
- 1 pressure indicator, zero to 60 psi
- 1 pressure indicator, zero to 30 inches of mercury
- 1 control panel
- 1 air/water separator, 200 gallons
- 1 flow totalizer/meter
- 1 air/water separator, 100 gallons (water recirculating tank)
- 1 liquid-ring vacuum pump, Atlantic Fluidics Model A200, 15-horsepower, 480-volt AC, 3-phase, explosion proof
- 1 transfer pump, Grundfos submersible pump, 240-volt AC, 1-phase, explosion proof
- 1 magnetic motor starter, open type for 15-horsepower, 480-volt AC, 3-phase, 480-volt AC coil with on-off switch legend plate
- 2 LSHH high-high level failsafes in air/water separator to turn off vacuum pump
- 1 LSH high level switch to turn on transfer pump
- 1 LSL low level switch to turn off transfer pump
- 1 TS high temperature failsafe to turn off vacuum pump.

3.5 Bioremediation Treatment System

The contaminated water and air streams which are extracted from the ground with the VEP units will be treated prior to discharge to the local sanitary sewer or the atmosphere. A

bioremediation treatment system installed previously by Richards Laboratories of Salt Lake City, Utah is currently being evaluated as to its effectiveness to treat the waste streams to the desired levels. If the system is deemed to be acceptable, the entire system will be resized to handle the required flows from the final extraction system. The permanent bioremediation system will be placed within the concrete block structure. The layout and components of the final system will be furnished upon acceptance of the bioremediation pilot test.

Should the bioremediation system be deemed to be unable to achieve the required cleanup levels, an alternate system will be designed and installed.

3.6 Vapor Monitoring Points

IT will install six vapor monitoring points (VMP) in the locations indicated in Figure 1. The VMPs are necessary to monitor vapor pressure in the vadose zone to determine the effectiveness and areal extent of vacuum produced by the vacuum extraction units. In addition, these points will also be installed slightly into the groundwater to monitor fluid levels within the extraction areas. Vapor monitoring points VMP-1 through VMP-6 will be installed utilizing hollow stem auguring techniques to a depth just into the cobble layer (10 to 12 feet below land surface). Each point will be constructed of approximately 8 feet of 0.02-inch slotted, 2-inch-diameter, Schedule 40 PVC screen and 3.5 feet of 2-inch-diameter solid Schedule 40 PVC casing. A 10/20 sand pack will be placed around the annulus of the point and extend one foot above the screen portion of the point. A one-foot bentonite seal will be placed above the sand pack to provide an impermeable layer to prevent the grout from permeating through the sand pack. The remaining annular space will be backfilled with a Portland grout mixture to seal off the point from the surface. The top of casings will be set approximately 0.5 feet below grade and will be housed in an 8-inch-diameter steel manhole. The VMPs will be developed upon completion. All drill cuttings and drilling fluid will be collected in 55-gallon drums to await proper disposal. It is recommended that no additional analytical sampling be required due to the extensive site assessment work that has previously been completed at the site.

Monitoring Wells MW-1, MW-2, MW-3, MW-5, MW-8, MW-9, MW-10, MW-11, MW-12, and MW-13 will be fitted with PVC slip caps equipped with threaded 1/4 ports to measure vacuum pressure in the vadose zone. In addition, these wells will also be used as

groundwater monitoring points to gauge fluid levels, as well as sampling points to determine the hydrocarbon plume characteristics.

The bentonite seal around the wellheads of Monitoring Wells MW-5 and MW-6 are currently exposed to the surface. To properly retrofit these wells, the old bentonite will have to be partially removed, and a Portland grout mixture placed above it.

3.7 Characterization of Naples Truck Stop Northeast Corner

One soil boring will be installed down to the top of the water table in the area surrounding the hydrocarbon-stained soils adjacent to the loading racks at Naples Truck Stop. The soil boring will be split-spoon continuous, and two soil samples exhibiting the highest headspace reading with a photoionization detector (PID) will be selected for laboratory analysis. Soil analysis will consist of BTEX using EPA Method 8020 and polynuclear aromatic hydrocarbons (PAH) using EPA Method 8100. The soil boring will be drilled during the same mobilization as the VMP installation.

3.8 Operation and Maintenance

During the first three months of operation, IT will perform O&M of the recovery system twice a month. The inspections will be necessary to properly adjust and monitor the remediation system. Inspections will include adjusting the amount of drawdown in the recovery areas, adjusting vacuum pressures, and adjusting the recovery rates to compensate for natural groundwater fluctuations. Maintenance inspections will also entail a detailed and thorough examination of the entire recovery system. Inspections will also include examining and checking the system for worn parts. The operational status of the system, along with other system and site data, will be recorded during the twice monthly visits.

To ensure the equipment is working properly, the following system parameters will be monitored and evaluated:

Service	Frequency
Groundwater Recovery Wells	
Record vacuum readings (hand held manometer)	Twice a month
Check seals/connections for leaks	Twice a month

Service	Frequency
Enhanced Vapor Extraction Systems	
Check vacuum pump for operation	Twice a month
Measure and record vacuum readings at units	Twice a month
Record total air flow rate	Twice a month
Adjust gate valve on incoming vacuum lines (balance system)	As necessary
Lubricate transfer pump	Quarterly
Check temperature of units for overheating	Twice a month
Check all seals/connections for leaks	Twice a month
Check inlet/outlet of vacuum pump for obstructions	Twice a month
Check level switches and probes	Once every month
Oil/Water Separator/Air Stripper	
Check for operation	Twice a month
Record pressure reading on air stripper (packing fouling)	Twice a month
Cleaning for iron or silt buildup	As necessary
Record amount of product collected	Twice a month
Lubricate transfer pump	Quarterly
Check all seals/connections for leaks	Twice a month
Check inlet/outlet lines for obstructions	Twice a month
Check level switches and probes (clean if necessary)	Once every month
Check/clean inlet to blower for obstructions	Twice a month
Check control panel for operation	Twice a month
Miscellaneous	
Inspect treatment compound	Once every month
Inspect all electrical connections	Once every month
Check lights of treatment compound	Once every month
Check heater and thermostat controls	Once every month
Remove any unnecessary material from treatment compound	Once every month
Check flow totalizer and record gallonage	Once every month
Check locks for proper operation	Once every month

3.9 Analytical Requirements

Analytical requirements for the remainder of this project are detailed in the CSAP found in Appendix C of this document.

3.10 Final Report

Within 60 days after completion of on-site activities, a draft final report will be issued to the USACE Omaha District for review and comment. The report will contain the information as discussed in Section 4.6 of this WP and Section 10.6 of the Scope of Services. After receipt of the USACE comments, the draft final report will be revised and issued as a final document to the appropriate parties per the submittal register in the Scope of Services.

3.11 Project Construction Schedule

A bar chart schedule is provided to illustrate the detailed work activities.

The schedule for the Naples Truck Stop project has been developed primarily as a sequencing tool. Durations on the schedule have been estimated based on production rates established by IT and the proposed subcontractors and our understanding of the USACE Scope of Services dated July 13, 1994. A copy of this schedule is included as Figure 7.

4.0 Submittals/Reporting/Project Controls

4.1 Daily Work Schedules

In order to closely coordinate work under this contract, the Contractor will prepare a Rapid Response Daily Work Order for approval and signature by the USACE On-Site Representative (OSR). This three-page document will outline the Contractor's proposed work schedule for the next workday. A sample copy is included at the end of this chapter.

4.2 Daily Report

In order to document the day's field activities, the Contractor will prepare a Rapid Response Quality Control Daily Report for review by the USACE-OSR. This five-page document will discuss weather conditions, work performed by IT and its subcontractors, inspections performed and their results, delays in job progress, verbal instruction/communications, personnel and equipment on site, treatment and disposal information, safety violations and corrective actions, sampling activities and locations, results of any on-site field screening, and the estimated cost for each day's activity. The Contractor's Operations Supervisor will submit this report prior to the conclusion of each day's activities. A sample copy is included at the end of this chapter.

4.3 Cost Tracking Systems

IT has developed a personal computer-based system designed as a project management tool for tracking estimated field costs named RapidDay. This system was designed with the flexibility to interact with IT's Job Tracking System (JTS) or as a stand-alone, estimated-cost tracking program.

Costs are tracked by the accounting accumulator categories of Labor (field and office), Equipment (IT owned and rental), Subcontractors, Materials (IT supplied and vendors), Travel and Living Expenses, Treatment and Disposal Costs, and Analytical. These costs are also totaled by job-specific phase and task numbers.

The responsibility for tracking, entering, and reporting project costs will be that of the Project Supervisor and Cost Administrator. These two individuals are responsible for all paper work associated with the on-site activities including, but not limited to, time sheets, purchase

orders, vendor invoices, petty cash, various status logs, and cost reporting. The Cost Administrator reports directly to the Project Manager in an administrative role.

Once daily information has been reviewed and edited, RapidDay prints daily summary reports by resource accumulator category. For job summary purposes, phase-to-date and resource category-to-date summaries are produced, comparing accumulated costs to budgeted and estimated costs to completion, and are reported on a weekly basis (at a minimum). The daily reports will be faxed to the USACE-OSR for review, approval, and signature as part of the Operations Supervisor's daily report.

IT's JTS is used to track and maintain information on actual costs at the Monroeville, Pennsylvania office. JTS is also used to produce periodic cost reports for the Project Manager, Project Director, and IT Corporate Directors. Project support costs (labor, equipment, and materials) are "picked up" from weekly JTS reports and entered into the RapidDay tracking program by the Cost Administrator.

The primary objectives of IT's JTS are management and project reporting, as well as the accounting and billing functions:

- **Management/Project Reporting:**
 - Collect actuals throughout the company
 - Provide budgeting/project control tools
 - Provide commitments/purchase order tracking
 - Match costs and revenue
 - Provide data for microanalysis.
- **Accounting/Billing:**
 - Perform intercompany accounting
 - Generate invoices
 - Simplify the revenue accrual process.

4.4 Project Meetings

Due to the anticipated short duration of this project, it will not be necessary to conduct regularly scheduled progress meetings at the job site. A preconstruction meeting will be conducted by the USACE on the first day of mobilization to the job site. All IT field personnel and the Project Manager will be in attendance. Should additional meetings be

required during the course of the project, they will be conducted by conference call. Parties involved for the conference call will be as appropriate to the discussion.

4.5 Weekly Reporting

A project status report will be submitted on a weekly basis beginning with site mobilization through site demobilization. Following demobilization, reporting will be biweekly through final invoice preparation. The report shall be the responsibility of the Contractor's Project Manager with input from the on-site supervisory personnel. The report will be submitted to the USACE Technical Manager and Fort Crook Project Engineer via telefax. The report shall be submitted no later than Tuesday, 8:00 a.m., of the following week being reported. The report shall include:

- Summary of work completed on site and off site
- Problems encountered with recommended corrective actions
- Deviations from the WP (subsequent to USACE approval)
- Planned activities for the upcoming week
- Any approved or anticipated changes in scope
- Summary of on-site personnel and changes involving such
- Tabular and/or graphic summaries of status of the project costs and schedule
- Summary of all disposal activity for the week (if any).

Any significant deviations from the budget or schedule shall be thoroughly addressed in this report. A sample of the suggested reporting form is included at the end of this chapter.

4.6 Final Report

4.6.1 Overview

The final report will present an overview of the field activities from mobilization through demobilization, unique or special tasks performed, additional work performed beyond the original scope of work, problems encountered and associated corrective action, the condition of the site upon demobilization, and the Contractor's conclusions and comments with regard to this project. The report will detail how the objectives of the scope of work were met or what levels of contaminants remain at the site.

Draft and final copies of the completion report shall be submitted. The draft final report shall be submitted within 60 days after completion of all field work including disposal. While all

submittals should be error free, an extra effort will be made to provide an error-free final completion report. Partial submittals will not be submitted unless previously approved or specifically requested. A cover letter will accompany each document and indicate the project, contract number, delivery order number, and to whom comments are to be submitted. The cover letter will not be bound into the document. The completion report will include (if applicable), but not limited to, the following.

4.6.2 Summary of Work Performed

The summary of work performed includes, but is not limited to:

- Narrative of the scope of work (including project objectives, mobilization and demobilization, site setup, miscellaneous work tasks, site operations)
- Safety discussion and report of accidents/incidents
- Discussion of the quality assurance/quality control (QA/QC) utilized by the Contractor specific to this delivery order
- Any other unique or special tasks performed or situations noted during the removal and treatment/disposal tasks.
- Photographs of all field work through demobilization and the overall site before and after this Contractor's work
- Summary of the final extraction and treatment systems
- As-built drawings of the remedial systems
- Survey report and backup notes
- Results of all analytical testing performed off site
- Conclusions.

4.6.3 Supporting Data

The tabulation of criteria, data, circulations, etc., which are performed but not included in detail in the report shall be assembled as appendices. Criteria information provided by the USACE Omaha District need not be reiterated, although they should be referenced as appropriate. The appendices shall include, but not be limited to:

- The final scope of services
- Completed permits and applicable licenses
- Waste manifests, waste profile sheets, and/or weigh tickets, if necessary
- Rapid Response Quality Control Daily Reports
- Weekly status reports
- Sampling and analysis documentation and results (to include discharge water sampling)
- Chain-of-custody records
- Photo documentation, to include one set of photographs
- List of visitors
- Project points of contact address and telephone (including site manager, treatment and disposal contractors, subcontractors' names, USACE Project Manager, Fort Crook personnel, etc.)
- Survey reports and as-built drawings.

4.6.4 Covers

The report will be in durable binders which hold pages firmly while allowing easy removal, addition, or deletion of pages. A report title page will identify the report title, the USACE, and the date.

4.6.5 Photographs

Included in the final report will be one copy of all photographs taken prior to starting and throughout the duration of the project. Photographs will be placed in photo albums in sequential order and labeled.

4.7 Site Controls

4.7.1 Overview

Security measures incorporated at the project site are designed to accomplish the following:

- Protect the public
- Control ingress and egress at the site including personnel, equipment, deliveries, and visitors
- Provide a safeguard against theft and/or destruction of equipment and facilities.

Security measures will be minimal based upon the fact that the majority of the work will be conducted with the fenced area of Questar Pipeline property.

4.7.2 General Security Rules

All employees are subject to the following rules:

- All personnel are required to sign in and out at the trailer once a day.
- Materials, tools, and equipment will not be permitted to leave the site without proper authorization.
- Property damage or loss will be thoroughly investigated and reported in accordance with IT procedures. These incidents shall be entered in a log specifically maintained for security incidents.

4.7.3 Breaches of Security

In the event unauthorized personnel are discovered in the immediate work area, they shall be properly identified and detained, if possible, until the Operations Supervisor can be notified. A detailed description of the incident shall be entered into the daily and/or security log. An attempt to locate unauthorized personnel shall be conducted and an entry shall be entered in the daily and/or security log noting time, date, actions taken, and any additional pertinent information.

4.7.4 Site Visitors

No visitors will be allowed access without the approval of the USACE-OSR or Contractor's Site Supervisor.

4.8 Contractor's Quality Control Program

4.8.1 Overview

Except for isolated tests or other items of work specified to be performed by government or another contractor, the quality of all work will be the responsibility of this Contractor. Sufficient inspections and tests of all items of work, including that of subcontractors, to ensure conformance to applicable WPs with respect to the quality of materials, workmanship, construction and remediation finish, functional performance, and identification will be performed on a continuing basis. The Contractor will furnish qualified personnel, appropriate facilities, instruments, and testing devices necessary for the performance of the QA/QC function. The controls will be adequate to cover all remediation operations, will be keyed to the proposed remediation sequence, and will be correlated by the Contractor's Project Manager. The QA/QC program will include the four phases of inspection and tests as detailed in the following sections. The USACE-OSR will be notified at least 24 hours in advance of each such test.

F

4.8.2 Preparatory Inspections

Preparatory inspections will be performed prior to beginning each feature of work on any on-site construction work. Preparatory inspections for the applicable feature or work will include: (1) review of all other contract requirements with the supervisors directly responsible for the performance of the work, (2) check to ensure that provisions have been made to provide required field control testing, (3) examine the work area to ascertain that all preliminary work has been completed, (4) verify all field dimensions and advise the USACE-OSR of any discrepancies, and (5) perform a physical examination of materials and equipment to ensure that all materials and/or equipment is on hand and in good working condition.

4.8.3 Initial Inspection

Initial inspection will be performed as soon as work begins on a representative portion of the particular feature of work and will include examination of the quality of workmanship as well as a review of control testing for compliance with contract requirements.

4.8.4 Follow-Up Inspections

Follow-up inspections will be performed continuously as any particular feature of work progresses, to ensure compliance with contract requirements, including control testing, until completion of that feature of work.

4.8.5 Safety Inspections

The Contractor will perform daily, weekly, and monthly safety inspections of the job site and the work in progress to ensure compliance with USACE Safety and Health Requirement Manual, the SSHP, IT corporate policy, and other occupational health and safety (H&S) requirements. Various reporting forms will be used to document these inspections and will include a notation of the safety deficiencies observed and the corrective actions taken. The Contractor will use his designated on-site supervisory staff to perform the required inspections and will supplement the staff with additional personnel as needed.

4.8.6 Reporting

All inspections and test results will be recorded daily. The sample "Rapid Response Quality Control Daily Report" form included at the end of this chapter, or other approved form, will be reproduced and fully executed to show that all inspections and tests shall be submitted to the USACE-OSR on the first workday following the inspection. This report, which is included in the Rapid Response Daily Work Order, details personnel utilized, inspections completed, and other pertinent information.

4.8.7 Records

The Contractor will maintain current records of QA/QC operations, activities, and tests performed including the work of suppliers and subcontractors. These records will be included in the Rapid Response Quality Control Daily Report form and will indicate a description of trades working on the project, the number of personnel working, the weather conditions encountered, any delays encountered, and acknowledgement of deficiencies noted along with the corrective actions taken on current and previous deficiencies. These records will include factual evidence that required activities or tests have been performed, including, but not limited to, the following:

- Type, number, and results of control activities and tests involved such as concrete break tests, density tests, and local building inspections

- Nature of defects and causes of rejection
- Proposed remedial action
- Corrective actions taken or alternate arrangements made.

These records will cover both conforming and defective or deficient features and will include a statement that supplies and materials incorporated in the work comply with the contract. These records will be furnished to the USACE-OSR daily.

4.8.8 Enforcement

The Contractor will stop work on any task or subcontractor's task, pending satisfactory correction of any deficiency noted by his QA/QC staff or by the USACE-OSR.

D
R
A
F
T

(CONTRACTOR'S NAME)

(CONTRACT NUMBER)

(SITE NAME AND LOCATION)

REPORT NO. _____ DELIVERY ORDER NO. _____ DATE _____
WEATHER _____ RAINFALL _____ INCHES TEMP: MIN. _____ MAX. _____

INSTRUCTIONS: THE CONTRACTOR SHALL SUBMIT THIS FORM DAILY AT THE CLOSE OF BUSINESS TO THE ON-SITE CORPS REPRESENTATIVE. CONCURRENTLY, THE CONTRACTOR SHALL PROVIDE ELECTRONIC ACCESS TO THE COMPLETED FORMS TO THE CORPS DISTRICT OFFICE AND THE AREA OFFICE.

1. WORK PERFORMED TODAY BY PRIMARY CONTRACTOR ON-SITE AND/OR OFF-SITE (INCLUDING A COMPLETE DESCRIPTION): _____

D R A

2. WORK PERFORMED BY SUBCONTRACTORS ON-SITE AND/OR OFF-SITE (INCLUDE A COMPLETE DESCRIPTION): _____

3. COMPLETE AND ATTACH THE DAILY PERSONNEL COST REPORT AT THE END OF THIS DOCUMENT AND LABEL AS APPENDIX 1.

THE DAILY PERSONNEL COST REPORT IS REQUIRED FOR ALL COST REIMBURSABLE WORK ON-SITE AND OFF-SITE INCLUDING SUBCONTRACTORS. AT A MINIMUM, THE COST REPORT SHALL PROVIDE: REPORT TITLE, SITE NAME, CONTRACTOR, CONTRACT NUMBER, DELIVERY ORDER NUMBER, DATE, EMPLOYEE NAME AND CLASSIFICATION, HOURLY LABOR RATES (REGULAR, OVERTIME OR OTHER), TOTAL HOURS (REGULAR, OVERTIME OR OTHER) AND PER DIEM. LABOR COSTS SHALL BE SUMMED FOR: EACH EMPLOYEE, THE ENTIRE DAILY REPORT, THE ENTIRE DELIVERY ORDER (UP TO THE DATE OF THE REPORT) AND THE PERCENTAGE OF THE ESTIMATED COST OF LABOR.

4. ON-SITE CONDITIONS WHICH RESULTED IN DELAYED PROGRESS: _____

[illegible]

6. LIST TYPE AND LOCATION OF TESTS PERFORMED AND RESULTS:

IDENTIFYING CHALLENGES AND OPPORTUNITIES

8. COMPLETE AND ATTACH THE DAILY EQUIPMENT COST REPORT AT THE END OF THIS DOCUMENT AND LABEL AS APPENDIX 2. THE DAILY EQUIPMENT COST REPORT IS REQUIRED FOR ALL COST REIMBURSABLE WORK ON-SITE AND OFF-SITE INCLUDING SUBCONTRACTORS. AT A MINIMUM, THE COST REPORT SHALL PROVIDE: REPORT TITLE, SITE NAME, CONTRACTOR, CONTRACT NUMBER, DELIVERY ORDER NUMBER, DATE, EQUIPMENT TYPE AND IDENTIFICATION NUMBER, HOURS IN SERVICE, HOURS STANDBY, HOURS IDLE TIME, COST RATE, AND DAYS IN SERVICE. EQUIPMENT COSTS SHALL BE SUMMED FOR: EACH TYPE, THE ENTIRE DAILY EFFORT, THE ENTIRE DELIVERY ORDER (UP TO THE DATE OF THE REPORT) AND THE PERCENTAGE OF THE ESTIMATED COST OF EQUIPMENT.

9. LIST THE TOTAL NUMBER OF SAMPLES COLLECTED AND TESTED FOR THE DAY:
COLLECTED: _____ TESTED: _____ AMPLIFYING INFO. _____

10. LIST THE TOTAL QUANTITY OF WASTEWATER TREATED: _____ GALLON(S)

11. LIST THE TOTAL NUMBER OF DRUMS OVERPACKED:

QUANTITY	LOCATION	HAZ-CAT
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

12. LIST THE TOTAL AMOUNT OF WASTE(S) REMOVED FROM THE SITE:

LIQUID: _____ BBL/GAL SOLIDS: _____ YDS/TONS

AMPLIFYING INFO: _____

QUANTITY	I.D. NO.	MATERIAL	MANIFEST NO.	DISPOSAL LOCATION

15. LIST ALL SAFETY VIOLATIONS OBSERVED AND CORRECTIVE ACTIONS:

[illegible]

17. COMPLETE AND ATTACH THE RAPID RESPONSE DAILY WORK ORDER AT THE END OF THIS DOCUMENT AND LABEL AS APPENDIX 4. THE DAILY WORK ORDER IS REQUIRED FOR ALL COST REIMBURSABLE WORK ON-SITE AND/OR OFF-SITE INCLUDING SUBCONTRACTORS. THIS DOCUMENT DETAILS THE CONTRACTORS NEXT DAY WORK EFFORT WHICH SHALL HAVE ADVANCE APPROVAL BY THE ON-SITE CORPS REPRESENTATIVE BEFORE THE CONTRACTOR IS ENTITLED TO COST REIMBURSEMENT.

18. ADDITIONAL COMMENTS/REMARKS: _____

19. CERTIFICATION: I CERTIFY THAT THE ABOVE REPORT IS COMPLETE AND CORRECT AND THAT I, OR MY AUTHORIZED REPRESENTATIVE, HAVE INSPECTED ALL WORK PERFORMED THIS DAY BY THE PRIMARY CONTRACTOR AND EACH SUBCONTRACTOR AND HAVE DETERMINED THAT ALL MATERIALS, EQUIPMENT, AND WORKMANSHIP ARE IN STRICT COMPLIANCE WITH THE PLANS AND SPECIFICATIONS, EXCEPT AS NOTED ABOVE.

D
CONTRACTORS DESIGNATED
QUALITY CONTROL REPRESENTATIVE

RAPID RESPONSE DAILY WORK ORDER

(PRIMARY CONTRACTOR'S NAME)

(CONTRACT NUMBER)

(SITE NAME AND LOCATION)

REPORT NO. _____ DELIVERY ORDER NO. _____ DATE _____

SUBCONTRACTOR(S):

GOVERNMENT AGENCIES ON-SCENE:

INSTRUCTIONS: THE CONTRACTOR SHALL BE ATTACHED TO THE RAPID RESPONSE
QUALITY CONTROL DAILY REPORT AND SHALL BE SUBMITTED DAILY AT THE
CLOSE OF BUSINESS TO THE ON-SITE CORPS REPRESENTATIVE. CONCURRENTLY,
THE CONTRACTOR SHALL PROVIDE ELECTRONIC ACCESS TO THE COMPLETED
FORMS TO THE CORPS DISTRICT OFFICE AND THE AREA OFFICE.

1. DESCRIPTION OF WORK TO BE PERFORMED BY CONTRACTOR(S), WITH AN
ESTIMATE OF THE PERCENTAGE TO BE COMPLETED: _____

2. NUMBER OF PERSONNEL AUTHORIZED TO PERFORM WORK ON-SITE AND OFF-SITE.

SUPERVISORS _____
ENGINEERS _____
GEOLOGIST _____
EMT _____
LABORERS _____

FOREMAN _____
CHEMIST _____
SAFETY _____
TECHS _____
OPERATORS _____

OTHERS (SPECIFY):

3. EQUIPMENT AND EXPENDABLE MATERIALS AUTHORIZED:

[illegible]

4. TEST AND/OR INSPECTIONS TO BE PERFORMED (INDICATE TYPE AND LOCATION): _____

5. ADDITIONAL COMMENTS/REMARKS: _____

6. CERTIFICATION: I CERTIFY THAT THE ABOVE WORK IS ORDERED AND AUTHORIZED BY THE ON-SITE CORPS REPRESENTATIVE IN THE PERFORMANCE OF THE ABOVE CITED CONTRACT.

A

R

ON-SITE CORPS REPRESENTATIVE

7. I ACKNOWLEDGE RECEIPT OF THIS WORK ORDER AND UNDERSTAND THAT ANY MODIFICATION TO THE WORK ORDER MUST BE IN WRITING AND APPROVED BY THE PROJECT MANAGER.

CONTRACTOR'S REPRESENTATIVE

8. WORK ORDER AMENDMENTS AND MODIFICATIONS (INCLUDE TIME, DESCRIPTION, AND AUTHORIZING PERSON): _____

ON-SITE CORPS REPRESENTATIVE

CONTRACTOR'S REPRESENTATIVE

D
R
A
F

5.0 Project Management and Staff

Project management is generally defined as the planning, control, and direction exercised to ensure that a project conforms to IT's contracted scope and specifications and that the project plans and scope are amended in a timely manner to reflect changes in circumstances. The goals of project management are to produce quality work which meets all contract requirements and to complete projects within budget and schedule to the USACE's satisfaction.

IT's project management system is designed to provide its managers with the informational system and control necessary to accomplish all elements of project management in accordance with the project requirements. Project planning, cost control, and execution are the three main components of project management.

5.1 Project Overview

The Contractor will be responsible for ensuring that sufficient supervision, equipment, labor, and materials, including H&S and QC provisions, are supplied to execute all the work activities associated with the enhanced soil vapor extraction and treatment systems at the Naples Truck Stop site in Naples, Utah.

5.2 Project Organization

The project organization provides a management and technical staff to support the removal and treatment/disposal of the contaminated water and sludge. The Contractor will provide:

- Personnel trained in hazardous waste work and experienced in groundwater extraction and treatment systems
- Management of labor, equipment, and material to control quality, schedule, and cost
- Responsible site management familiar with wage requirements and reporting
- An independent QA/QC site program which will ensure technical and scientific accuracy in all sampling activities

- Experienced sampling personnel to collect and ship the required samples along with executing the proper paperwork
- The development, coordination, and implementation of the site H&S program.

5.3 Project Personnel

The Program Manager for this delivery order will be Mr. Albert Meyers, who will ensure that contractual obligations are met. Mr. Douglas Wehner will serve as General Superintendent for this project, ensuring that all reporting, scheduling, and budgetary obligations are met. Mr. Meyers and Mr. Wehner are located at IT's regional office in Cincinnati, Ohio.

Mr. Tom Mathison will serve as the Project Manager and will manage all technical and field activities, review all submittals to the USACE, prepare weekly reports, and monitor the budget and schedule. Mr. Mathison is located at IT's regional office in Monroeville, Pennsylvania.

Mr. Dean Robb is the On-Site Superintendent and will be responsible for maintaining contact with the USACE-OSR. Mr. Robb will supervise all on-site activities, prepare the daily submittals, and maintain close contact with IT project management. Mr. Robb is located at IT's regional office in Denver, Colorado.

Mr. Warren Houseman will be the H&S Specialist on this project. As H&S Specialist, he will oversee/advise on-site supervision and ensure IT's H&S obligations are being met. Mr. Houseman is located at the Monroeville, Pennsylvania office.

The Cost Administrator will be responsible for accumulating the daily project cost using the RapidDay job training system.

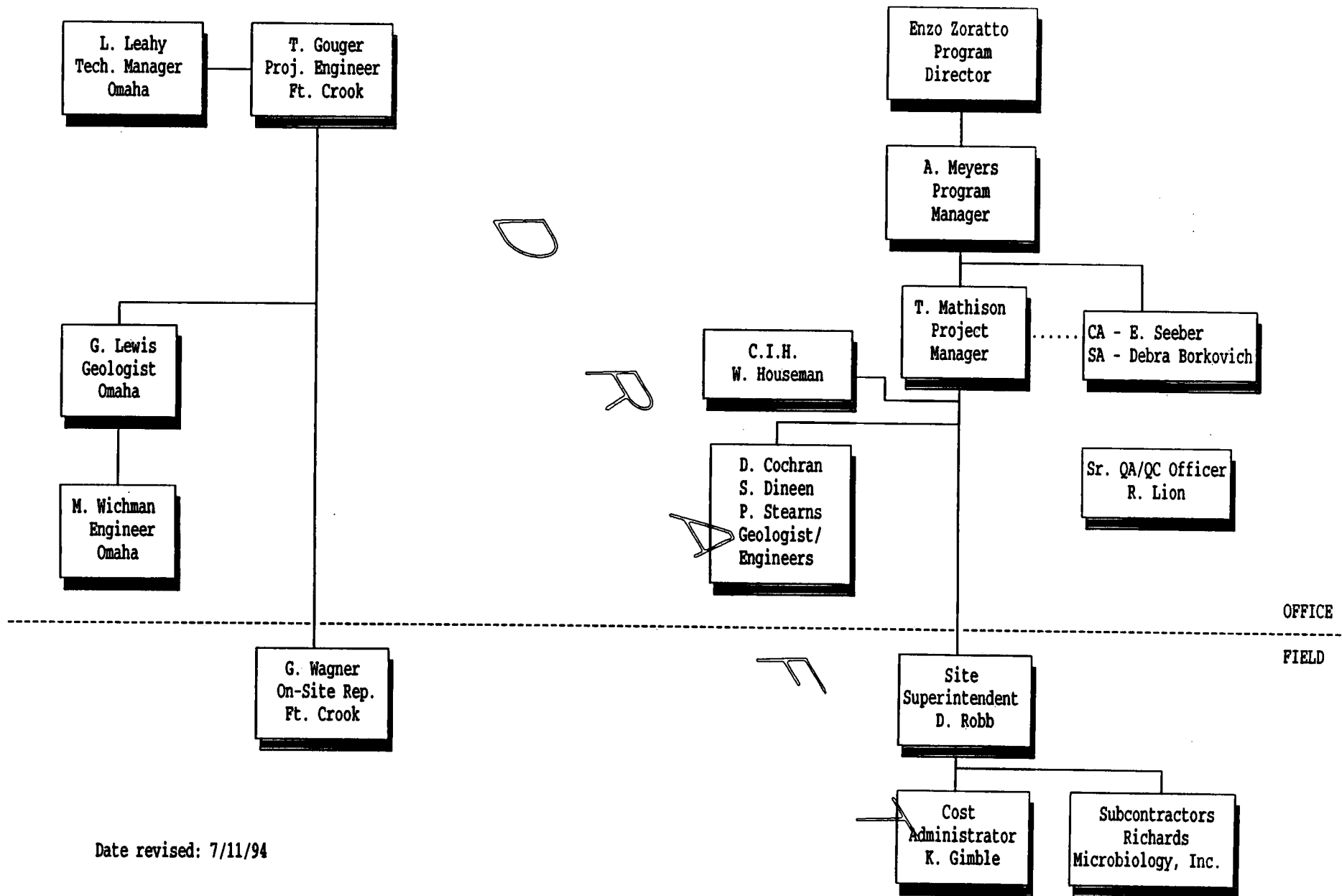
Mr. Steve Dineen, Mr. Dave Cochran, and Mr. Phil Stearns will provide the technical assistance required during the design and construction of the remedial systems for this project. All these individuals are located in IT's Monroeville, Pennsylvania office.

The resumes for the project personnel are included in Appendix E.

ORGANIZATIONAL CHART

USACE

IT CORPORATION



Date revised: 7/11/94

Naples Truck Stop
Project No. 519063

TABLES

Table 1
IT Groundwater Analytical Results

Sample Location	MW-1		MW-C3		MWt-4	
Sample Tag Number	MW-1		MW-C3		MWt-4	
Lab ID Number	B4-05-061-01		B4-05-061-02		B4-05-061-03	
Location Description	MW-1 water sample		MW-C3 water sample		MWt-4 water sample	
Date	5/4/94		5/4/94		5/4/94	
Time	8:45		9:10		10:00	
Units	ug/L LQ Det.Lim.		ug/L LQ Det.Lim.		ug/L LQ Det.Lim.	
Method(s)	EPA8020		EPA8020		EPA8020	
Methyl chloride	N/A		N/A		N/A	
Methyl bromide	N/A		N/A		N/A	
Vinyl chloride	N/A		N/A		N/A	
Chloroethane	N/A		N/A		N/A	
Methylene chloride	N/A		N/A		N/A	
Acetone	N/A		N/A		N/A	
Carbon disulfide	N/A		N/A		N/A	
1,1-Dichloroethylene	N/A		N/A		N/A	
1,1-Dichloroethane	N/A		N/A		N/A	
trans-1,2-Dichloroethylene	N/A		N/A		N/A	
cis-1,2-Dichloroethylene	N/A		N/A		N/A	
Chloroform	N/A		N/A		N/A	
1,2-Dichloroethane	N/A		N/A		N/A	
2-Butanone	N/A		N/A		N/A	
1,1,1-Trichloroethane	N/A		N/A		N/A	
Carbon tetrachloride	N/A		N/A		N/A	
Vinyl acetate	N/A		N/A		N/A	
Dichlorobromomethane	N/A		N/A		N/A	
1,2-Dichloropropane	N/A		N/A		N/A	
trans-1,3-Dichloropropene	N/A		N/A		N/A	
Trichloroethylene	N/A		N/A		N/A	
Chlorodibromomethane	N/A		N/A		N/A	
1,1,2-Trichloroethane	N/A		N/A		N/A	
Benzene	21000	500	ND	1	8200	100
cis-1,3-Dichloropropene	N/A		N/A		N/A	
2-Chloroethylvinyl ether	N/A		N/A		N/A	
Bromoform	N/A		N/A		N/A	
2-Hexanone	N/A		N/A		N/A	
4-Methyl-2-pentanone	N/A		N/A		N/A	
Tetrachloroethylene	N/A		N/A		N/A	
1,1,2,2-Tetrachloroethane	N/A		N/A		N/A	
Toluene	22000	500	ND	1	110	100
Chlorobenzene	N/A		N/A		N/A	
Ethylbenzene	1100	500	ND	1	130	100
Styrene	N/A		N/A		N/A	
Xylenes, total	8800	500	ND	1	200	100
BTEX total	52900		ND		8640	
TPH - Low Boilers (mg/L)						
Gasoline	N/A		N/A		N/A	

Table 1
IT Groundwater Analytical Results

Sample Location	MWT-5	MW-7	MW-6
Sample Tag Number	MWT-5	MW-7	MW-6
Lab ID Number	B4-05-061-04	B4-05-061-05	B4-05-061-06
Location Description	MWT-5 water sample	MW-7 water sample	MW-6 water sample
Date	5/4/94	5/4/94	5/4/94
Time	10:15	10:30	10:45
Units	ug/L LQ Det.Lim.	ug/L LQ Det.Lim.	ug/L LQ Det.Lim.
Method(s)	EPA8020	EPA8020	EPA8020
Methyl chloride	N/A	N/A	N/A
Methyl bromide	N/A	N/A	N/A
Vinyl chloride	N/A	N/A	N/A
Chloroethane	N/A	N/A	N/A
Methylene chloride	N/A	N/A	N/A
Acetone	N/A	N/A	N/A
Carbon disulfide	N/A	N/A	N/A
1,1-Dichloroethylene	N/A	N/A	N/A
1,1-Dichloroethane	N/A	N/A	N/A
trans-1,2-Dichloroethylene	N/A	N/A	N/A
cis-1,2-Dichloroethylene	N/A	N/A	N/A
Chloroform	N/A	N/A	N/A
1,2-Dichloroethane	N/A	N/A	N/A
2-Butanone	N/A	N/A	N/A
1,1,1-Trichloroethane	N/A	N/A	N/A
Carbon tetrachloride	N/A	N/A	N/A
Vinyl acetate	N/A	N/A	N/A
Dichlorobromomethane	N/A	N/A	N/A
1,2-Dichloropropane	N/A	N/A	N/A
trans-1,3-Dichloropropene	N/A	N/A	N/A
Trichloroethylene	N/A	N/A	N/A
Chlorodibromomethane	N/A	N/A	N/A
1,1,2-Trichloroethane	N/A	N/A	N/A
Benzene	21000 500	16 1	2.4 1
cis-1,3-Dichloropropene	N/A	N/A	N/A
2-Chloroethylvinyl ether	N/A	N/A	N/A
Bromoform	N/A	N/A	N/A
2-Hexanone	N/A	N/A	N/A
4-Methyl-2-pentanone	N/A	N/A	N/A
Tetrachloroethylene	N/A	N/A	N/A
1,1,2,2-Tetrachloroethane	N/A	N/A	N/A
Toluene	ND 500	30 1	14 1
Chlorobenzene	N/A	N/A	N/A
Ethylbenzene	ND 500	6.5 1	2.9 1
Styrene	N/A	N/A	N/A
Xylenes, total	ND 500	40 1	17 1
BTEX total	21000	92.5	36.3
TPH - Low Boilers (mg/L)			
Gasoline	N/A	N/A	N/A

Table 1
IT Groundwater Analytical Results

Sample Location	MW-9		MW-10		MW-11	
Sample Tag Number	MW-9		MW-10		MW-11	
Lab ID Number	B4-05-061-07		B4-05-061-08		B4-05-061-09	
Location Description	MW-9 water sample		MW-10 water sample		MW-11 water sample	
Date	5/4/94		5/4/94		5/4/94	
Time	11:10		11:20		12:00	
Units	ug/L LQ Det.Lim.		ug/L LQ Det.Lim.		ug/L LQ Det.Lim.	
Method(s)	EPA8020		EPA8020		EPA8020	
Methyl chloride	N/A		N/A		N/A	
Methyl bromide	N/A		N/A		N/A	
Vinyl chloride	N/A		N/A		N/A	
Chloroethane	N/A		N/A		N/A	
Methylene chloride	N/A		N/A		N/A	
Acetone	N/A		N/A		N/A	
Carbon disulfide	N/A		N/A		N/A	T
1,1-Dichloroethylene	N/A		N/A		N/A	
1,1-Dichloroethane	N/A		N/A		N/A	
trans-1,2-Dichloroethylene	N/A		N/A		N/A	
cis-1,2-Dichloroethylene	N/A		N/A		N/A	
Chloroform	N/A		N/A		N/A	
1,2-Dichloroethane	N/A		N/A		N/A	
2-Butanone	N/A		N/A	A	N/A	
1,1,1-Trichloroethane	N/A		N/A		N/A	
Carbon tetrachloride	N/A		N/A		N/A	
Vinyl acetate	N/A		N/A		N/A	
Dichlorobromomethane	N/A		N/A		N/A	
1,2-Dichloropropane	N/A		N/A		N/A	
trans-1,3-Dichloropropene	N/A		N/A		N/A	
Trichloroethylene	N/A		N/A		N/A	
Chlorodibromomethane	N/A		N/A		N/A	
1,1,2-Trichloroethane	N/A		N/A		N/A	
Benzene	20000	250	47000	2000	12000	500
cis-1,3-Dichloropropene	N/A		N/A		N/A	
2-Chloroethylvinyl ether	N/A		N/A		N/A	
Bromoform	N/A		N/A		N/A	
2-Hexanone	N/A		N/A		N/A	
4-Methyl-2-pentanone	N/A		N/A		N/A	
Tetrachloroethylene	N/A		N/A		N/A	
1,1,2,2-Tetrachloroethane	N/A		N/A		N/A	
Toluene	48000	250	67000	2000	4500	500
Chlorobenzene	N/A		N/A		N/A	
Ethylbenzene	2500	250	3200	2000	580	500
Styrene	N/A		N/A		N/A	
Xylenes, total	260000	250	24000	2000	2400	500
BTEX total	330500		141200		19480	
TPH - Low Boilers (mg/L)						
Gasoline	N/A		N/A		N/A	

Table 1
IT Groundwater Analytical Results

Sample Location	MW-12			MW-1			MW-3		
Sample Tag Number	MW-12			MW1-6-29			MW3-6-30		
Lab ID Number	B4-05-061-10			B4-07-003-02			B4-07-003-03		
Location Description	MW-12 water sample			Monitoring Well 1			Monitoring Well 3		
Date	5/4/94			6/29/94			6/30/94		
Time	12:10			17:45			7:44		
Units	ug/L	LQ	Det.Lim.	ug/L	LQ	Det.Lim.	ug/L	LQ	Det.Lim.
Method(s)	EPA8020			EPA8020			EPA8020		
Methyl chloride	N/A			N/A			N/A		
Methyl bromide	N/A			N/A			N/A		
Vinyl chloride	N/A			N/A			N/A		
Chloroethane	N/A			N/A			N/A		
Methylene chloride	N/A			N/A			N/A		
Acetone	N/A			N/A			N/A		
Carbon disulfide	N/A			N/A			N/A		
1,1-Dichloroethylene	N/A			N/A			N/A		
1,1-Dichloroethane	N/A			N/A			N/A		
trans-1,2-Dichloroethylene	N/A			N/A			N/A		
cis-1,2-Dichloroethylene	N/A			N/A			N/A		
Chloroform	N/A			N/A			N/A		
1,2-Dichloroethane	N/A			N/A			N/A		
2-Butanone	N/A			N/A			N/A		
1,1,1-Trichloroethane	N/A			N/A			N/A		
Carbon tetrachloride	N/A			N/A			N/A		
Vinyl acetate	N/A			N/A			N/A		
Dichlorobromomethane	N/A			N/A			N/A		
1,2-Dichloropropane	N/A			N/A			N/A		
trans-1,3-Dichloropropene	N/A			N/A			N/A		
Trichloroethylene	N/A			N/A			N/A		
Chlorodibromomethane	N/A			N/A			N/A		
1,1,2-Trichloroethane	N/A			N/A			N/A		
Benzene	52000	2000		21000	500		ND		1
cis-1,3-Dichloropropene	N/A			N/A			N/A		
2-Chloroethylvinyl ether	N/A			N/A			N/A		
Bromoform	N/A			N/A			N/A		
2-Hexanone	N/A			N/A			N/A		
4-Methyl-2-pentanone	N/A			N/A			N/A		
Tetrachloroethylene	N/A			N/A			N/A		
1,1,2,2-Tetrachloroethane	N/A			N/A			N/A		
Toluene	33000	2000		370	500		ND		1
Chlorobenzene	N/A			N/A			N/A		
Ethylbenzene	2600	2000		730	500		ND		1
Styrene	N/A			N/A			N/A		
Xylenes, total	15000	2000		2500	500		ND		1
BTEX total	102600			24600			ND		
TPH - Low Boilers (mg/L)									
Gasoline	N/A			N/A			N/A		

Table 1
IT Groundwater Analytical Results

Sample Location	MW-06	MW-7	MW-9
Sample Tag Number	MW06-6-30	MW7-6-30	MW9-6-30
Lab ID Number	B4-07-003-04	B4-07-003-05	B4-07-003-06
Location Description	Monitoring Well 6	Monitoring Well 7	Monitoring Well 9
Date	6/30/94	6/30/94	6/30/94
Time	8:00	7:49	7:39
Units	ug/L LQ Det.Lim.	ug/L LQ Det.Lim.	ug/L LQ Det.Lim.
Method(s)	EPA8020	EPA8020	EPA8020
Methyl chloride	N/A	N/A	N/A
Methyl bromide	N/A	N/A	N/A
Vinyl chloride	N/A	N/A	N/A
Chloroethane	N/A	N/A	N/A
Methylene chloride	N/A	N/A	N/A
Acetone	N/A	N/A	N/A
Carbon disulfide	N/A	N/A	N/A
1,1-Dichloroethylene	N/A	N/A	N/A
1,1-Dichloroethane	N/A	N/A	N/A
trans-1,2-Dichloroethylene	N/A	N/A	N/A
cis-1,2-Dichloroethylene	N/A	N/A	N/A
Chloroform	N/A	N/A	N/A
1,2-Dichloroethane	N/A	N/A	N/A
2-Butanone	N/A	N/A	N/A
1,1,1-Trichloroethane	N/A	N/A	N/A
Carbon tetrachloride	N/A	N/A	N/A
Vinyl acetate	N/A	N/A	N/A
Dichlorobromomethane	N/A	N/A	N/A
1,2-Dichloropropane	N/A	N/A	N/A
trans-1,3-Dichloropropene	N/A	N/A	N/A
Trichloroethylene	N/A	N/A	N/A
Chlorodibromomethane	N/A	N/A	N/A
1,1,2-Trichloroethane	N/A	N/A	N/A
Benzene	1.3 1	ND 1	5700 100
cis-1,3-Dichloropropene	N/A	N/A	N/A
2-Chloroethylvinyl ether	N/A	N/A	N/A
Bromoform	N/A	N/A	N/A
2-Hexanone	N/A	N/A	N/A
4-Methyl-2-pentanone	N/A	N/A	N/A
Tetrachloroethylene	N/A	N/A	N/A
1,1,2,2-Tetrachloroethane	N/A	N/A	N/A
Toluene	ND 1	1.2 1	820 100
Chlorobenzene	N/A	N/A	N/A
Ethylbenzene	ND 1	ND 1	120 100
Styrene	N/A	N/A	N/A
Xylenes, total	ND 1	ND 1	600 100
BTEX total	1.3	1.2	7240
TPH - Low Boilers (mg/L)			
Gasoline	N/A	N/A	N/A

Table 1
IT Groundwater Analytical Results

Sample Location	MW-10			MW-14			MW-15		
Sample Tag Number	MW10-6-30			MW140-6-29			MW15-06-29		
Lab ID Number	B4-07-002-01			B4-07-002-02			B4-07-002-03		
Location Description	Monitoring Well 10			Monitoring Well 14			Monitoring Well 15		
Date	6/30/94			6/29/94			6/29/94		
Time	8:10			18:10			18:13		
Units	ug/L	LQ	Det.Lim.	ug/L	LQ	Det.Lim.	ug/L	LQ	Det.Lim.
Method(s)	EPA8020			EPA8020			EPA8020		
Methyl chloride	N/A			N/A			N/A		
Methyl bromide	N/A			N/A			N/A		
Vinyl chloride	N/A			N/A			N/A		
Chloroethane	N/A			N/A			N/A		
Methylene chloride	N/A			N/A			N/A		
Acetone	N/A			N/A			N/A		
Carbon disulfide	N/A			N/A			N/A		T
1,1-Dichloroethylene	N/A			N/A			N/A		
1,1-Dichloroethane	N/A			N/A			N/A		
trans-1,2-Dichloroethylene	N/A			N/A			N/A		
cis-1,2-Dichloroethylene	N/A			N/A			N/A		
Chloroform	N/A			N/A			N/A		
1,2-Dichloroethane	N/A			N/A			N/A		
2-Butanone	N/A			N/A			N/A		
1,1,1-Trichloroethane	N/A			N/A			N/A		
Carbon tetrachloride	N/A			N/A			N/A		
Vinyl acetate	N/A			N/A			N/A		
Dichlorobromomethane	N/A			N/A			N/A		
1,2-Dichloropropane	N/A			N/A			N/A		
trans-1,3-Dichloropropene	N/A			N/A			N/A		
Trichloroethylene	N/A			N/A			N/A		
Chlorodibromomethane	N/A			N/A			N/A		
1,1,2-Trichloroethane	N/A			N/A			N/A		
Benzene	40000	500		ND	1		ND	1	
cis-1,3-Dichloropropene	N/A			N/A			N/A		
2-Chloroethylvinyl ether	N/A			N/A			N/A		
Bromoform	N/A			N/A			N/A		
2-Hexanone	N/A			N/A			N/A		
4-Methyl-2-pentanone	N/A			N/A			N/A		
Tetrachloroethylene	N/A			N/A			N/A		
1,1,2,2-Tetrachloroethane	N/A			N/A			N/A		
Toluene	52000	500		ND	1		ND	1	
Chlorobenzene	N/A			N/A			N/A		
Ethylbenzene	2000	500		ND	1		ND	1	
Styrene	N/A			N/A			N/A		
Xylenes, total	14000	500		ND	1		ND	1	
BTEX total	108000			ND			ND		
TPH - Low Boilers (mg/L)									
Gasoline	N/A			N/A			N/A		

Table 1
IT Groundwater Analytical Results

Sample Location	NGMW-01			RW-07			RW-08		
Sample Tag Number	NGMW01-06-30			RW07-6-29			RW08-6-29		
Lab ID Number	B4-07-002-04			B4-07-002-05			B4-07-002-06		
Location Description	Monitoring Well NGMW-01			Recovery Well 7			Recovery Well 8		
Date	6/30/94			6/29/94			6/29/94		
Time	7:25			17:55			18:00		
Units	ug/L	LQ	Det.Lim.	ug/L	LQ	Det.Lim.	ug/L	LQ	Det.Lim.
Method(s)	EPA8020			EPA8020			EPA8020		
Methyl chloride	N/A			N/A			N/A		
Methyl bromide	N/A			N/A			N/A		
Vinyl chloride	N/A			N/A			N/A		
Chloroethane	N/A			N/A			N/A		
Methylene chloride	N/A			N/A			N/A		
Acetone	N/A			N/A			N/A		
Carbon disulfide	N/A			N/A			N/A		
1,1-Dichloroethylene	N/A			N/A			N/A		
1,1-Dichloroethane	N/A			N/A			N/A		
trans-1,2-Dichloroethylene	N/A			N/A			N/A		
cis-1,2-Dichloroethylene	N/A			N/A			N/A		
Chloroform	N/A			N/A			N/A		
1,2-Dichloroethane	N/A			N/A			N/A		
2-Butanone	N/A			N/A			N/A		
1,1,1-Trichloroethane	N/A			N/A			N/A		
Carbon tetrachloride	N/A			N/A			N/A		
Vinyl acetate	N/A			N/A			N/A		
Dichlorobromomethane	N/A			N/A			N/A		
1,2-Dichloropropane	N/A			N/A			N/A		
trans-1,3-Dichloropropene	N/A			N/A			N/A		
Trichloroethylene	N/A			N/A			N/A		
Chlorodibromomethane	N/A			N/A			N/A		
1,1,2-Trichloroethane	N/A			N/A			N/A		
Benzene	ND		1	7400		1	17000		500
cis-1,3-Dichloropropene	N/A			N/A			N/A		
2-Chloroethylvinyl ether	N/A			N/A			N/A		
Bromoform	N/A			N/A			N/A		
2-Hexanone	N/A			N/A			N/A		
4-Methyl-2-pentanone	N/A			N/A			N/A		
Tetrachloroethylene	N/A			N/A			N/A		
1,1,2,2-Tetrachloroethane	N/A			N/A			N/A		
Toluene	2.7		1	ND		1	ND		500
Chlorobenzene	N/A			N/A			N/A		
Ethylbenzene	ND		1	ND		1	ND		500
Styrene	N/A			N/A			N/A		
Xylenes, total	1.2		1	ND		1	800		500
BTEX total	3.9			7400			17800		
TPH - Low Boilers (mg/L)									
Gasoline	N/A			N/A			N/A		

Table 2
Richards Labs Analytical Results

Analyte	Sample Location	Influent			Effluent			MW-1			MW-1		
	Sample Tag Number							MW1/618/01			MW1/618/01		
	Lab ID Number	1736G			1737G			1776G			1776G		
	Location Description	Vernal Site Influent			Vernal Site Effluent								
	Date Sampled	5/4/94			5/4/94			6/3/94			6/8/94		
	Time												
	Units	PPB	LQ	Det.Lim.	PPB	LQ	Det.Lim.	PPB	LQ	Det.Lim.	PPB	LQ	Det.Lim.
	Method(s)	602			602			602			602		
	Dilution	1:100			1:1			1:100			1:250		
Benzene		16926		500	28		5	17493		500	22159		1000
Toluene		30099		500	96		5	1409		500	1722		1000
Ethylbenzene		3758		500	<5		5	964		500	910		1000
Total Xylene		27486		500	52		5	5029		500	5319		1000
Napthalene								<500		500			
Total BTEX		78269			176		5	24894			30100		
TPH		92044		5000	<500								

Table 3
Air Analytical Results

Sample Location	System 1 Air Eff.	SYSTEM BLANK
Sample Tag Number	AIR EFF	SYSTEM BLANK
Lab ID Number	AD6108	ABLKV3
Location Description	System 1 Air Eff.	SYSTEM BLANK
Sample Date	5/5/94	N/A
Sample Time	14:20	N/A
Analysis Date	6/7/94	6/7/94
Method(s)	TO-14	TO-14
Dilution	1:55430	1:1
Units	ppb (V/V) LQ Det. Lim.	ppb (V/V) LQ Det. Lim.
CAS #	Compound	
75-71-8	Dichlorodifluoromethane	ND 11000 ND 0.20
76-14-2	1,2-Dichlorotetrafluoroethane	ND 11000 ND 0.20
74-87-3	Chloromethane	ND 11000 ND 0.20
75-01-4	Vinyl Chloride	ND 11000 ND 0.20
74-83-9	Bromomethane	ND 11000 ND 0.20
75-00-3	Chloroethane	ND 11000 ND 0.20
75-69-4	Trichlorofluoromethane	ND 11000 ND 0.20
75-35-4	1,1-Dichloroethene	ND 11000 ND 0.20
76-13-1	1,1,2-Trichlorotrifluoroethane	ND 11000 ND 0.20
75-09-2	Methylene Chloride	ND 11000 ND 0.20
75-34-3	1,1-Dichloroethane	ND 11000 ND 0.20
156-59-2	cis-1,2-Dichloroethene	ND 11000 ND 0.20
67-66-3	Chloroform	ND 11000 ND 0.20
71-55-6	1,1,1-Trichloroethane	ND 11000 ND 0.20
56-23-5	Carbon Tetrachloride	ND 11000 ND 0.20
71-43-2	Benzene	600000 ND 11000 ND 0.20
107-06-2	1,2-Dichloroethane	ND 11000 ND 0.20
79-01-6	Trichloroethene	ND 11000 ND 0.20
78-87-5	1,2-Dichloropropane	ND 11000 ND 0.20
10061-01-5	cis-1,3-Dichloropropene	ND 11000 ND 0.20
108-88-3	Toluene	1200000 ND 11000 ND 0.20
10061-02-6	trans-1,3-Dichloropropene	ND 11000 ND 0.20
79-00-5	1,1,2-Trichloroethane	ND 11000 ND 0.20
127-18-4	Tetrachloroethene	ND 11000 ND 0.20
106-93-4	1,2-Dibromomethane	ND 11000 ND 0.20
108-90-7	Chlorobenzene	ND 11000 ND 0.20
100-41-4	Ethylbenzene	87000 11000 ND 0.20
IT5-30-5	m/p- Xylene	460000 11000 ND 0.20
95-47-6	o- Xylene	120000 11000 ND 0.20
100-42-5	Styrene	ND 11000 ND 0.20
79-34-5	1,1,2,2-Tetrachloroethane	ND 11000 ND 0.20
108-67-8	1,3,5-Trimethylbenzene	22000 11000 ND 0.20
95-63-6	1,2,4-Trimethylbenzene	56000 11000 ND 0.20
541-73-1	1,3-Dichlorobenzene	ND 11000 ND 0.20
106-46-7	1,4-Dichlorobenzene	ND 11000 ND 0.20
95-50-1	1,2-Dichlorobenzene	ND 11000 ND 0.20
100-44-7	Benzyl Chloride	ND 11000 ND 0.20
120-82-1	1,2,4-Trichlorobenzene	ND 11000 ND 0.20
87-68-3	Hexachlorobutadiene	ND 11000 ND 0.20

Table 3
Air Analytical Results

Sample Location	System 1 Air Eff..	System 1 Air Eff..	System 1 Air Eff..
Sample Tag Number	AS-1	AS-1	AS-2
Lab ID Number	AD2020	AD2020 Dilution	AD2021
Location Description	System 1 Air Eff.	System 1 Air Eff.	System 1 Air Eff.
Sample Date	3/25/94	3/25/94	3/25/94
Sample Time	15:30	15:30	14:30
Analysis Date	4/5/94	4/8/94	4/6/94
Method(s)	TO-14	TO-14	TO-14
Dilution	1:1963	1:25961	1:2275
Units	ppb (V/V) LQ Det. Lim.	ppb (V/V) LQ Det. Lim.	ppb (V/V) LQ Det. Lim.
CAS #	Compound		
71-43-2	Benzene	310000 E 390	430000 5200 370000 E 460
108-88-3	Toluene	59000 390	94000 5200 91000 460
100-41-4	Ethylbenzene	ND 390	19000 5200 730 460
IT5-30-5	m/p- Xylene	ND 390	40000 5200 ND 460
95-47-6	o- Xylene	ND 390	7600 5200 ND 460

Sample Location	System 1 Air Eff..	SYSTEM BLANK	SYSTEM BLANK
Sample Tag Number	AS-2	SYSTEM BLANK	SYSTEM BLANK
Lab ID Number	AD2021 Dilution	ABLK L5	ABLK L7
Location Description	System 1 Air Eff.	SYSTEM BLANK	SYSTEM BLANK
Sample Date	3/25/94	N/A	N/A
Sample Time	14:30	N/A	N/A
Analysis Date	4/8/94	4/5/94	4/7/94
Method(s)	TO-14	TO-14	TO-14
Dilution	1:30292	1:1	1:1
Units	ppb (V/V) LQ Det. Lim.	ppb (V/V) LQ Det. Lim.	ppb (V/V) LQ Det. Lim.
CAS #	Compound		
71-43-2	Benzene	450000 6100 ND 0.20 ND 0.20	
108-88-3	Toluene	110000 6100 ND 0.20 ND 0.20	
100-41-4	Ethylbenzene	20000 6100 ND 0.20 ND 0.20	
IT5-30-5	m/p- Xylene	42000 6100 ND 0.20 ND 0.20	
95-47-6	o- Xylene	7900 6100 ND 0.20 ND 0.20	

Sample Location	System 1 Air Eff..	System 1 Air Eff..	METHOD BLANK
Sample Tag Number	Air Eff 6-30	Air Eff 6-30	METHOD BLANK
Lab ID Number	AD8656	AD8656 DUP	METHOD BLANK
Location Description	System 1 Air Eff.	System 1 Air Eff.	METHOD BLANK
Sample Date	6/30/94	6/30/94	N/A
Sample Time	8:15	8:15	N/A
Analysis Date	7/14/94	7/14/94	7/14/94
Method(s)	TO-14	TO-14	TO-14
Dilution	1:1.44	1:1.44	1:1
Units	ppm (V/V) L Det. Lim.	ppm (V/V) LQ Det. Lim.	ppM (V/V) L Det. Lim.
CAS #	Compound		
71-43-2	Benzene	960 31 990 31 ND 1.6	
108-88-3	Toluene	1400 27 1400 27 ND 1.3	
100-41-4	Ethylbenzene	130 23 130 23 ND 1.2	
1330-20-7	m/p- Xylene	580 23 590 23 ND 1.2	
95-47-6	o- Xylene	160 23 170 23 ND 1.2	

Table 4
Groundwater Influent/Effluent Analytical Results

Sample Location	Influent		Effluent		Influent		Effluent	
Sample Tag Number	1-INFLUENT		1-EFFLUENT		2-INFLUENT		2-EFFLUENT	
Lab ID Number	B4-03-292-01		B4-03-292-02		B4-03-292-03		B4-03-292-04	
Location Description	Air Stripper Influent		Air Stripper Effluent		Air Stripper Influent		Air Stripper Effluent	
Sample Date	3/25/94		3/25/94		3/25/94		3/25/94	
Time	2:45		2:50		14:30		14:30	
Units	ug/L	Det.Lim.	ug/L	Det.Lim.	ug/L	Det.Lim.	ug/L	Det.Lim.
Method(s)	EPA8240		EPA8240		EPA8240		EPA8240	
Methyl chloride	ND	1000	ND	10	ND	1000	ND	10
Methyl bromide	ND	500	ND	5	ND	500	ND	5
Vinyl chloride	ND	1000	ND	10	ND	1000	ND	10
Chloroethane	ND	1000	ND	10	ND	1000	ND	10
Methylene chloride	ND	1000	ND	10	ND	1000	ND	10
Acetone	ND	10000	ND	100	ND	10000	ND	100
Carbon disulfide	ND	500	ND	5	ND	500	ND	5
1,1-Dichloroethylene	ND	500	ND	5	ND	500	ND	5
1,1-Dichloroethane	ND	500	ND	5	ND	500	ND	5
trans-1,2-Dichloroethylene	ND	500	ND	5	ND	500	ND	5
cis-1,2-Dichloroethylene	ND	500	ND	5	ND	500	ND	5
Chloroform	ND	500	ND	5	ND	500	ND	5
1,2-Dichloroethane	ND	500	ND	5	ND	500	ND	5
2-Butanone	ND	10000	ND	100	ND	10000	ND	100
1,1,1-Trichloroethane	ND	500	ND	5	ND	500	ND	5
Carbon tetrachloride	ND	500	ND	5	ND	500	ND	5
Vinyl acetate	ND	1000	ND	10	ND	1000	ND	10
Dichlorobromomethane	ND	500	ND	5	ND	500	ND	5
1,2-Dichloropropane	ND	500	ND	5	ND	500	ND	5
trans-1,3-Dichloropropene	ND	500	ND	5	ND	500	ND	5
Trichloroethylene	ND	500	ND	5	ND	500	ND	5
Chlorodibromomethane	ND	500	ND	5	ND	500	ND	5
1,1,2-Trichloroethane	ND	500	ND	5	ND	500	ND	5
Benzene	15000	500	42	5	16000	500	19	5
cis-1,3-Dichloropropene	ND	500	ND	5	ND	500	ND	5
2-Chloroethylvinyl ether	ND	1000	ND	10	ND	1000	ND	10
Bromoform	ND	500	ND	5	ND	500	ND	5
2-Hexanone	ND	5000	ND	50	ND	5000	ND	50
4-Methyl-2-pentanone	ND	5000	ND	50	ND	5000	ND	50
Tetrachloroethylene	ND	500	ND	5	ND	500	ND	5
1,1,2,2-Tetrachloroethane	ND	500	ND	5	ND	500	ND	5
Toluene	1900	500	5.6	5	1900	500	ND	5
Chlorobenzene	ND	500	ND	5	ND	500	ND	5
Ethylbenzene	490 J	500	ND	5	490 J	500	ND	5
Styrene	ND	500	ND	5	ND	500	ND	5
Xylenes, total	1100	500	ND	5	1100	500	ND	5
BTEX total	N/A		N/A		N/A		N/A	
TPH - Low Boilers (mg/L)								
Gasoline	N/A		N/A		N/A		N/A	

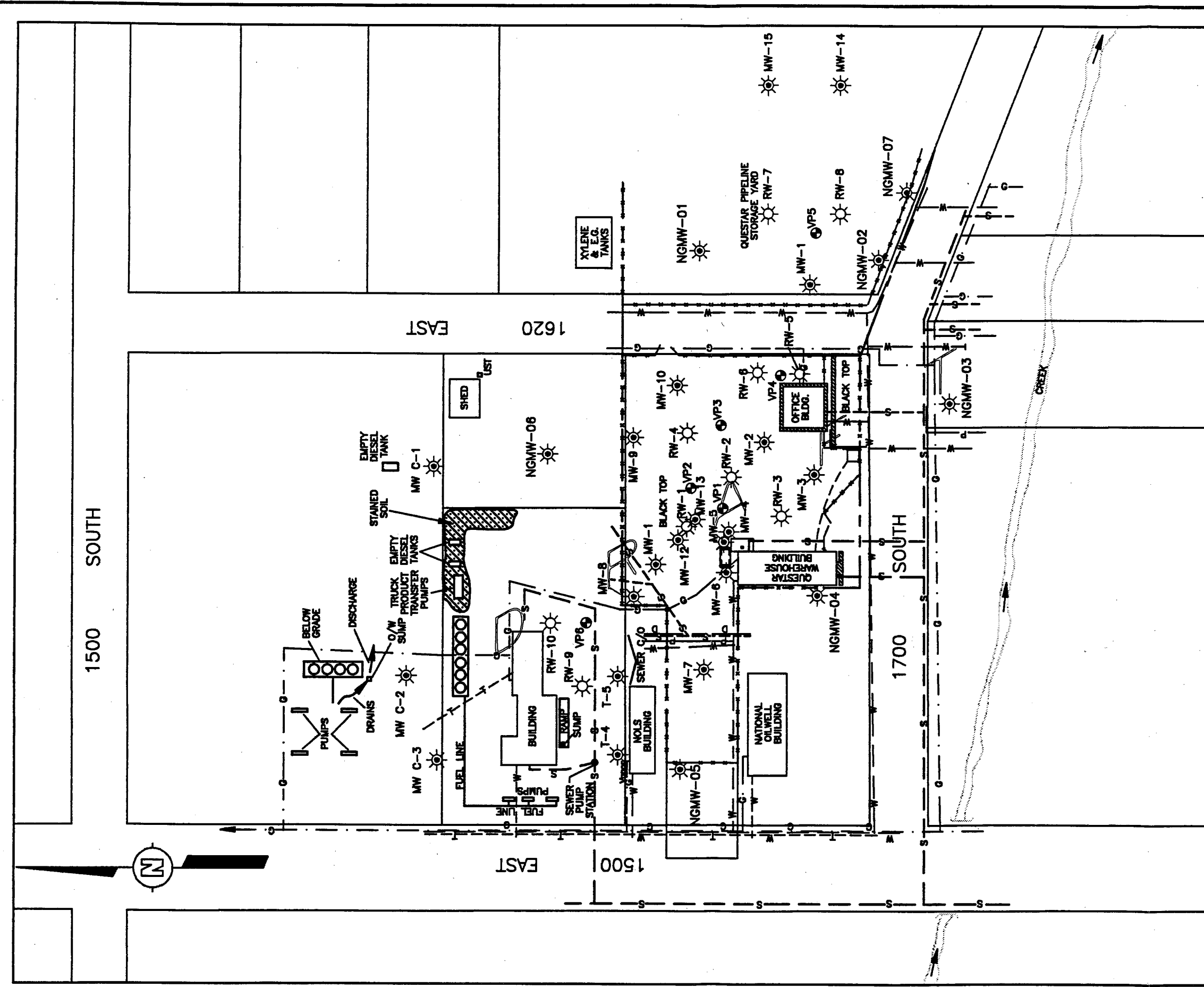
Table 4
Groundwater Influent/Effluent Analytical Results

Sample Location	Effluent		Effluent		System Effluent		Bio System Effluent	
Sample Tag Number	3-EFFLUENT		4-EFFLUENT		System Effluent		BIOEFFLUENT BIO SYS	
Lab ID Number	B4-04-043-01		B4-04-250-01		B4-05-078-01		B4-05-079-01	
Location Description	Air Stripper Effluent		Air Stripper Effluent		Air Stripper Effluent		Air Stripper Effluent	
Sample Date	4/5/94		4/20/94		5/5/94		5/5/94	
Time	14:35		14:23		9:00		10:00	
Units	ug/L	Det.Lim.	ug/L	Det.Lim.	ug/L	Det.Lim.	ug/L	Det.Lim.
Method(s)	EPA8240		EPA8020		EPA8015_MOD		EPA8020	
Methyl chloride	ND	10	N/A		N/A		N/A	
Methyl bromide	ND	5	N/A		N/A		N/A	
Vinyl chloride	ND	10	N/A		N/A		N/A	
Chloroethane	ND	10	N/A		N/A		N/A	
Methylene chloride	ND	10	N/A		N/A		N/A	
Acetone	ND	100	N/A		N/A		N/A	
Carbon disulfide	ND	5	N/A		N/A		N/A	
1,1-Dichloroethylene	ND	5	N/A		N/A		N/A	
1,1-Dichloroethane	ND	5	N/A		N/A		N/A	
trans-1,2-Dichloroethylene	ND	5	N/A		N/A		N/A	
cis-1,2-Dichloroethylene	ND	5	N/A		N/A		N/A	
Chloroform	ND	5	N/A		N/A		N/A	
1,2-Dichloroethane	ND	5	N/A		N/A		N/A	
2-Butanone	ND	100	N/A		N/A		N/A	
1,1,1-Trichloroethane	ND	5	N/A		N/A		N/A	
Carbon tetrachloride	ND	5	N/A		N/A		N/A	
Vinyl acetate	ND	10	N/A		N/A		N/A	
Dichlorobromomethane	ND	5	N/A		N/A		N/A	
1,2-Dichloropropane	ND	5	N/A		N/A		N/A	
trans-1,3-Dichloropropene	ND	5	N/A		N/A		N/A	
Trichloroethylene	ND	5	N/A		N/A		N/A	
Chlorodibromomethane	ND	5	N/A		N/A		N/A	
1,1,2-Trichloroethane	ND	5	N/A		N/A		N/A	
Benzene	ND	5	78	20	N/A		20	1
cis-1,3-Dichloropropene	ND	5	N/A		N/A		N/A	
2-Chloroethylvinyl ether	ND	10	N/A		N/A		N/A	
Bromoform	ND	5	N/A		N/A		N/A	
2-Hexanone	ND	50	N/A		N/A		N/A	
4-Methyl-2-pentanone	ND	50	N/A		N/A		N/A	
Tetrachloroethylene	ND	5	N/A		N/A		N/A	
1,1,2,2-Tetrachloroethane	ND	5	N/A		N/A		N/A	
Toluene	ND	5	180	20	N/A		31	1
Chlorobenzene	ND	5	N/A		N/A		N/A	
Ethylbenzene	ND	5	32	20	N/A		3.4	1
Styrene	ND	5	N/A		N/A		N/A	
Xylenes, total	ND	5	320	20	N/A		31	1
BTEX total	N/A		610		N/A		85.4	
TPH - Low Boilers (mg/L)								
Gasoline	N/A		4	2	0.12	0.1	N/A	

Table 4
Groundwater Influent/Effluent Analytical Results

Sample Location	BTEX EFFLUENT STR		SYSTEM INFLUENT		STRIPPER EFFLUENT		Air Stripper	
Sample Tag Number	BTEX EFFLUENT STR		SYSTEM INFLUENT		STRIPPER EFFLUENT		AS-6-30	
Lab ID Number	B4-05-084-01		B4-05-084-02		B4-05-085-01		B4-07-003-01	
Location Description	Air Stripper Eff.		Air Stripper Influent		Air Stripper Eff.		Air Stripper Effluent	
Sample Date	5/5/94		5/5/94		5/5/94		6/30/94	
Time	10:15		10:45		9:00		8:03	
Units	ug/L	Det.Lim.	ug/L	Det.Lim.	ug/L	Det.Lim.	ug/L	Det.Lim.
Method(s)	EPA8020		EPA8020		EPA8015_MOD		EPA8020	
Methyl chloride	N/A		N/A		N/A		N/A	
Methyl bromide	N/A		N/A		N/A		N/A	
Vinyl chloride	N/A		N/A		N/A		N/A	
Chloroethane	N/A		N/A		N/A		N/A	
Methylene chloride	N/A		N/A		N/A		N/A	
Acetone	N/A		N/A		N/A		N/A	
Carbon disulfide	N/A		N/A		N/A		N/A	
1,1-Dichloroethylene	N/A		N/A		N/A		N/A	
1,1-Dichloroethane	N/A		N/A		N/A		N/A	
trans-1,2-Dichloroethylene	N/A		N/A		N/A		N/A	
cis-1,2-Dichloroethylene	N/A		N/A		N/A		N/A	
Chloroform	N/A		N/A		N/A		N/A	
1,2-Dichloroethane	N/A		N/A		N/A		N/A	
2-Butanone	N/A		N/A		N/A		N/A	
1,1,1-Trichloroethane	N/A		N/A		N/A		N/A	
Carbon tetrachloride	N/A		N/A		N/A		N/A	
Vinyl acetate	N/A		N/A		N/A		N/A	
Dichlorobromomethane	N/A		N/A		N/A		N/A	
1,2-Dichloropropane	N/A		N/A		N/A		N/A	
trans-1,3-Dichloropropene	N/A		N/A		N/A		N/A	
Trichloroethylene	N/A		N/A		N/A		N/A	
Chlorodibromomethane	N/A		N/A		N/A		N/A	
1,1,2-Trichloroethane	N/A		N/A		N/A		N/A	
Benzene	200	10	24000	500	N/A		90	10
cis-1,3-Dichloropropene	N/A		N/A		N/A		N/A	
2-Chloroethylvinyl ether	N/A		N/A		N/A		N/A	
Bromoform	N/A		N/A		N/A		N/A	
2-Hexanone	N/A		N/A		N/A		N/A	
4-Methyl-2-pentanone	N/A		N/A		N/A		N/A	
Tetrachloroethylene	N/A		N/A		N/A		N/A	
1,1,2,2-Tetrachloroethane	N/A		N/A		N/A		N/A	
Toluene	660	10	52000	500	N/A		250	10
Chlorobenzene	N/A		N/A		N/A		N/A	
Ethylbenzene	150	10	4000	500	N/A		110	10
Styrene	N/A		N/A		N/A		N/A	
Xylenes, total	1500	10	28000	500	N/A		900	10
BTEX total	2510		108000		N/A		1350	
TPH - Low Boilers (mg/L)								
Gasoline	N/A		N/A		9	1	5.7	1.0

FIGURES



LEGEND

- ☀ MONITORING WELL LOCATIONS
- ☀ RECOVERY WELL LOCATIONS
- ⊕ PROPOSED VAPOR MONITORING POINTS

BURIED UTILITIES

- Water Line — W —
- Sewer Line — S —
- Gas Line — G —
- Drain Line — D —
- Power Line — P —
- Telephone Line — T —
- Property Boundary Lines — — —

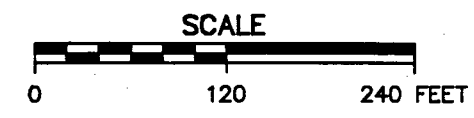
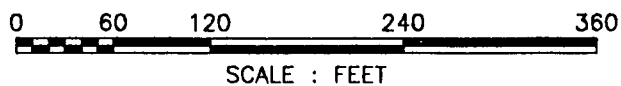
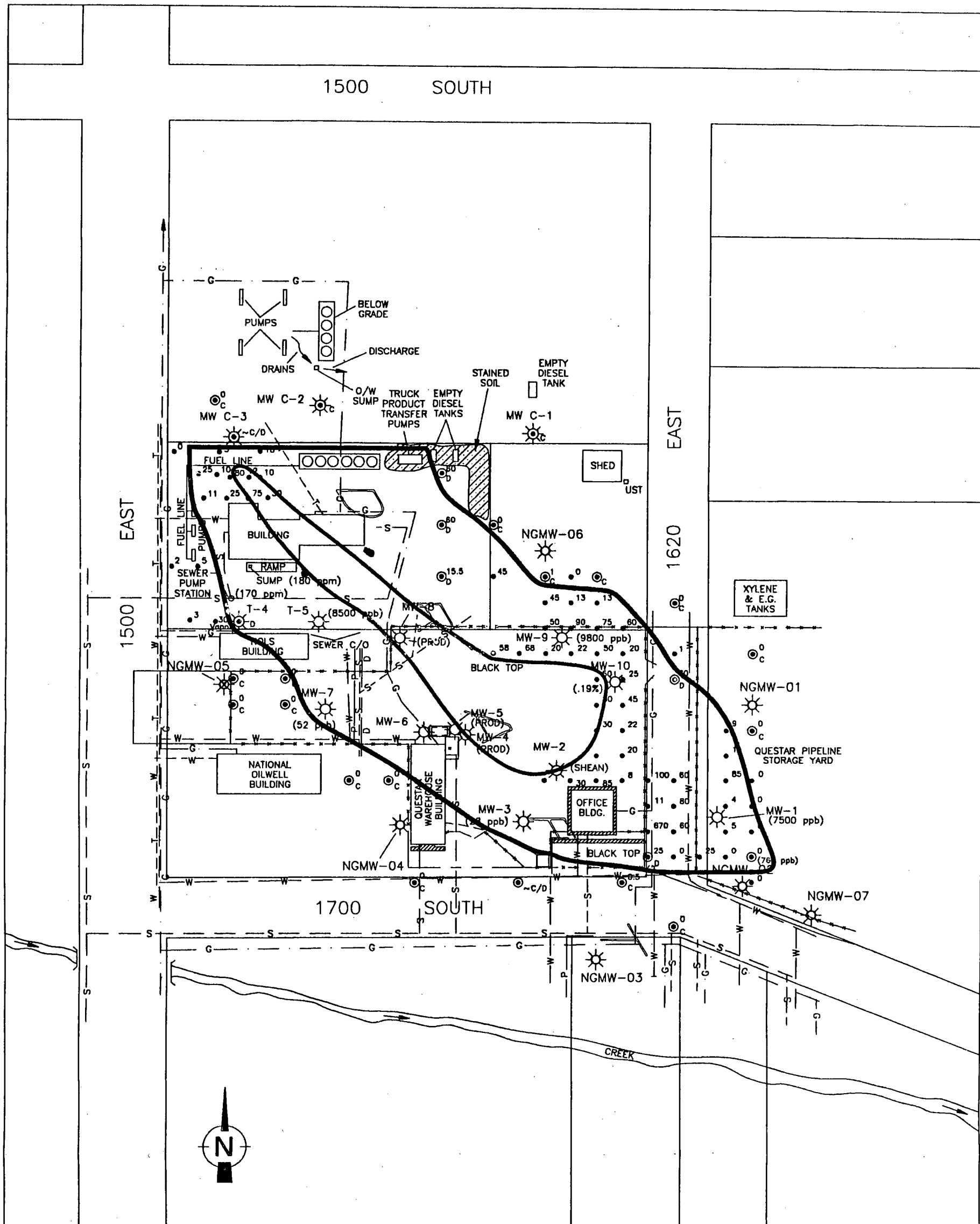


FIGURE 1
 SITE PLAN
 NAPLES TRUCK STOP
 PREPARED FOR
 USACOE
 OMAHA, NEBRASKA





LEGEND

- S.G. S.G. Soil gas in ppm above background
- T.K. T.K. Test kit on water D = Positive for Hydrocarbons
C = Negative for Hydrocarbons
- ☀ Monitoring well location
- Soil gas sample location
- ⊙ Water sample
- ☀ EPA monitoring well location

Note: Monitoring well data based on 02/15/94 sampling by Questar
Building dimensions approximate
Utility locations approximate

- BURIED UTILITIES
- Water Line ——— W ———
- Sewer Line ——— S ———
- Gas Line ——— G ———
- Drain Line ——— D ———
- Power Line ——— P ———
- Telephone Line ——— T ———
- Property Boundary Lines ———
- Perimeter of dissolved phase (Estimated) ———
- Perimeter of product phase (Estimated) ———

TECHNICAL ASSISTANCE TEAM FOR EMERGENCY
RESPONSE, REMOVAL AND PREVENTION
EPA CONTRACT 68-WO-0037

TITLE:
NAPLES GAS
Vernal, Utah
SAMPLE LOCATION MAP

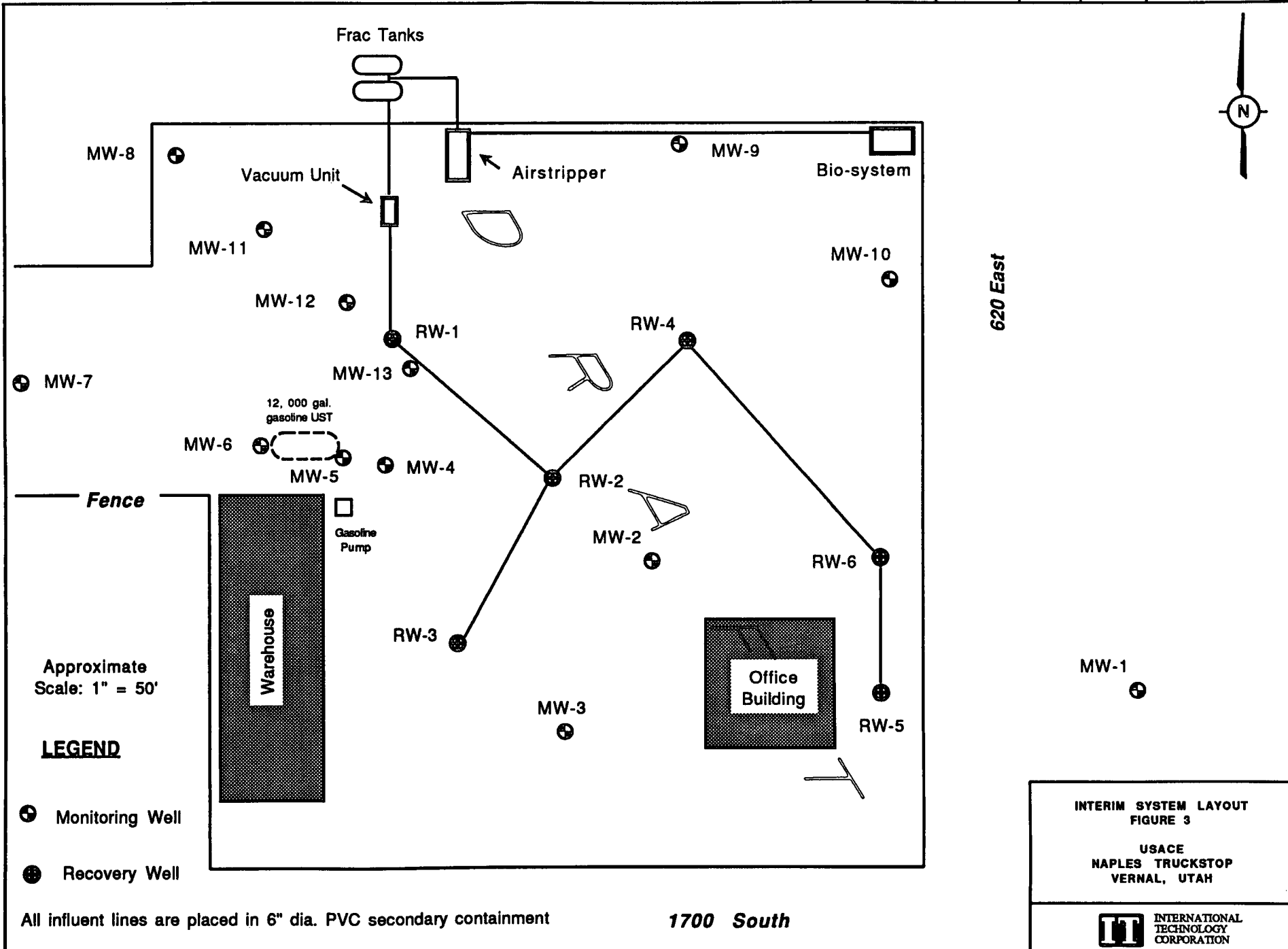
T.D.D. T08-9402-017

ZTNAPLE2

ecology & environment, inc.
DENVER, COLORADO

FIG. 2

Date: 03/30/94 Drawn by: RSM Scale: _____



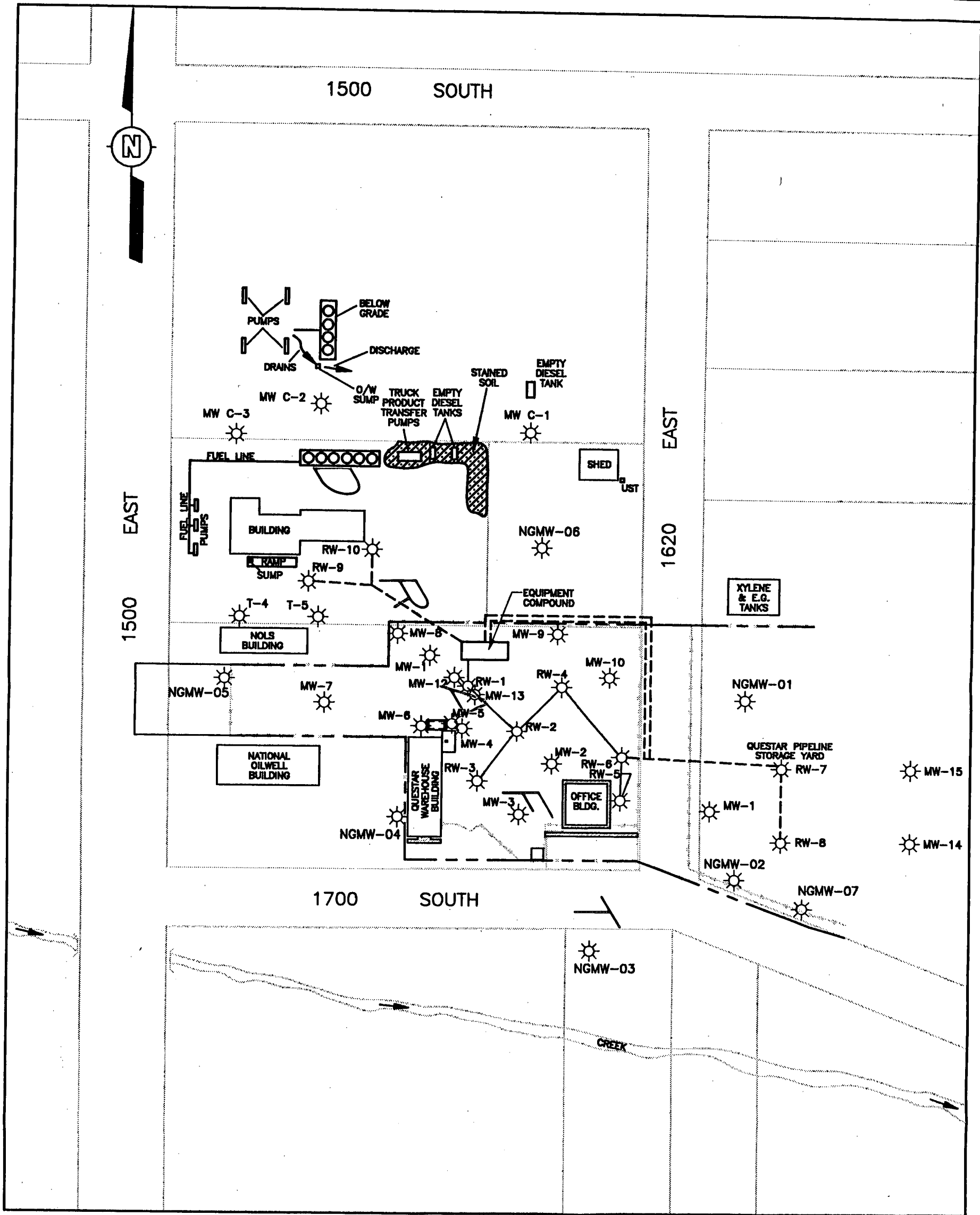
All influent lines are placed in 6" dia. PVC secondary containment

1700 South

132298

DRAWN BY	JES	CHECKED BY		DRAWING NUMBER	519063-B2
	07-26-94		APPROVED BY		

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Do Not Scale This Drawing



USACOE
OMAHA, NEBRASKA

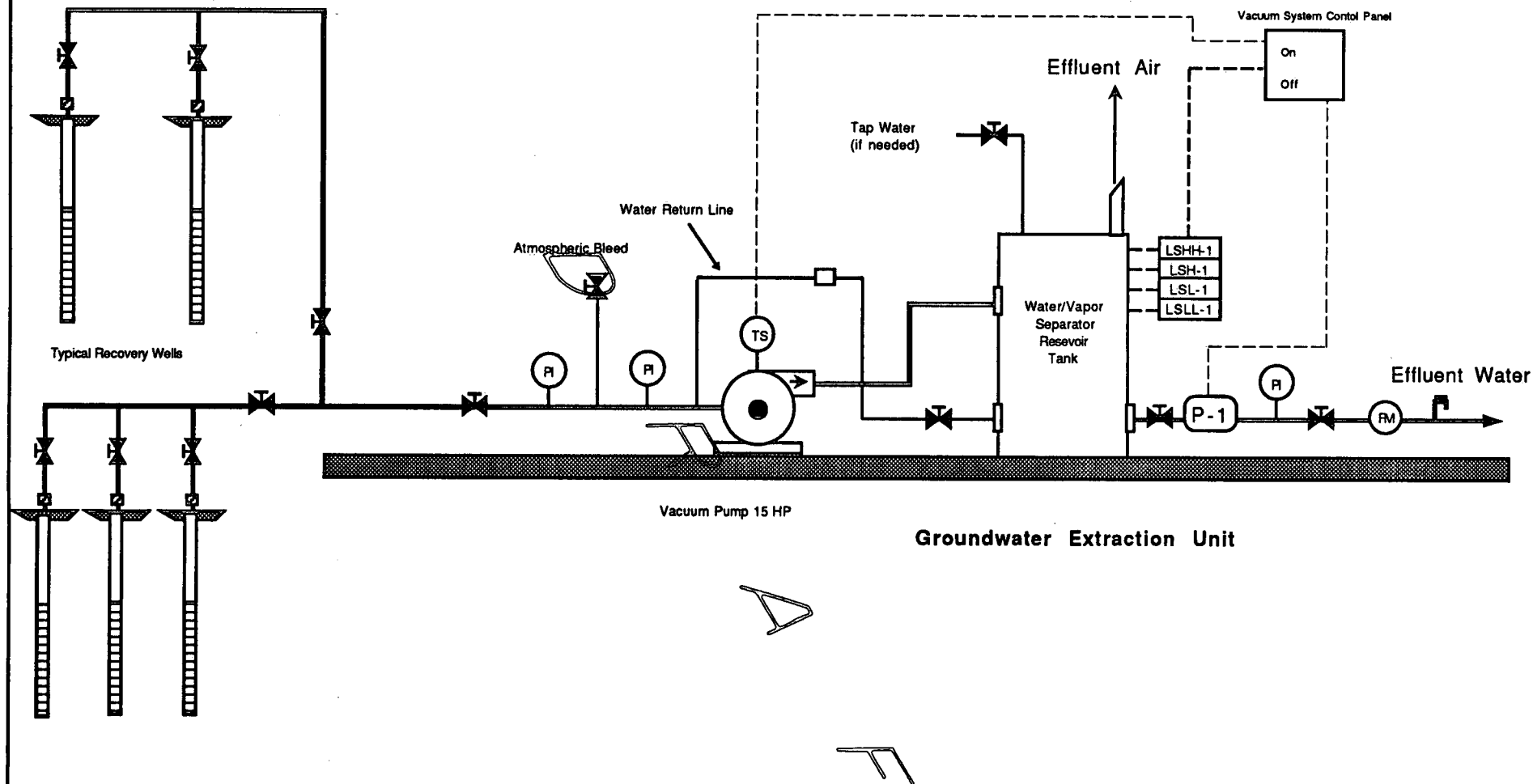
PREPARED FOR

FINAL RECOVERY
SYSTEM LAYOUT
NAPLES TRUCK STOP

FIGURE 4



- LEGEND
- MONITORING WELL LOCATIONS
 - RECOVERY WELL LOCATIONS
 - EXISTING PIPING
 - PROPOSED PIPING
 - PROPERTY BOUNDARY LINES



LEGEND:

	Sampling Port		Sediment Filter		Level Switch High High
	Flowmeter		Check Valve		Level Switch High
	Pressure Gauge		Gate Valve		Level Switch Low
	Temperature Sensor		Transfer Pump		Level Switch Low Low
			Threaded Port to Measure Vacuum Pressure		Failsafe Control Cable

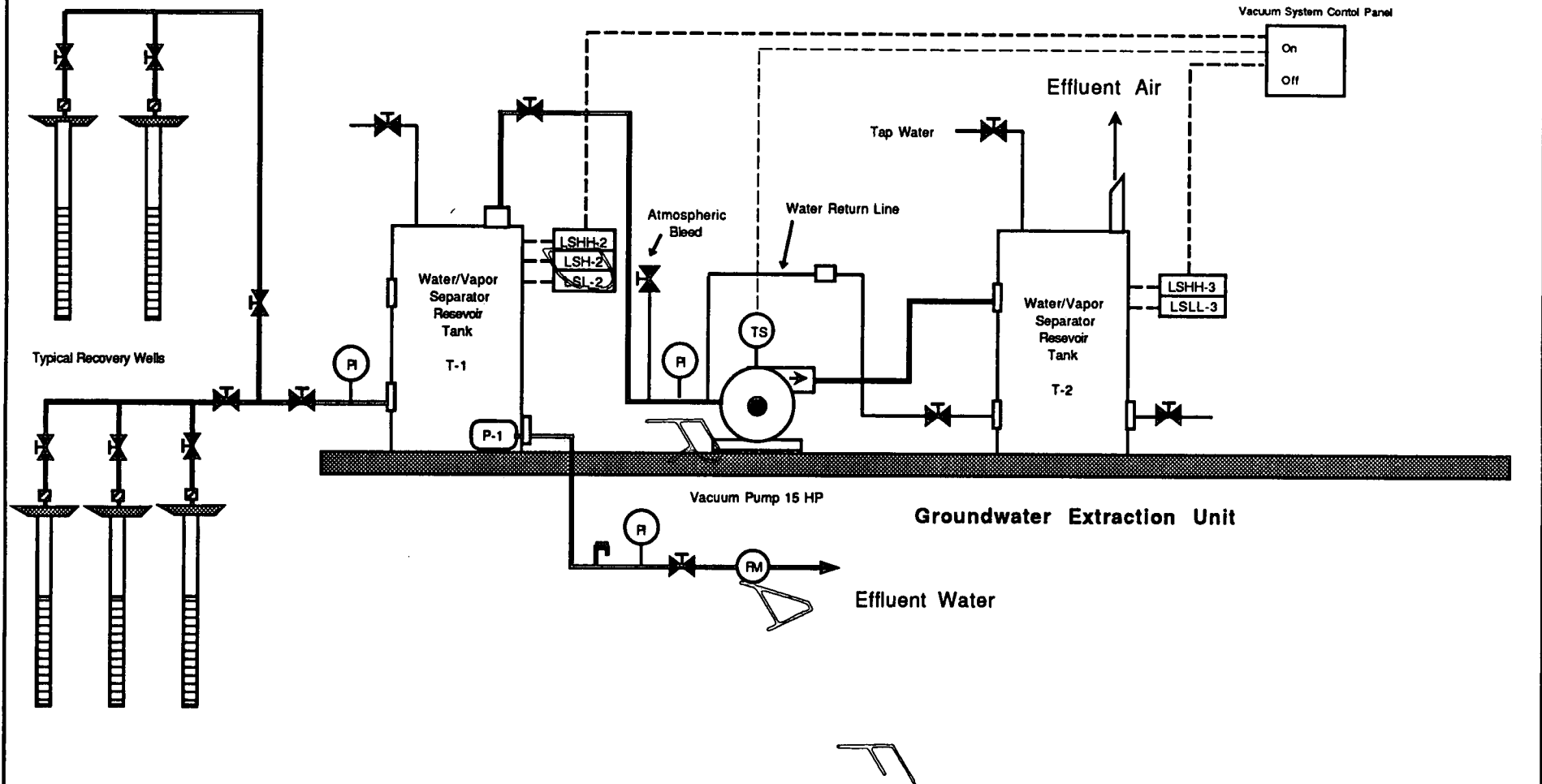
240 VAC
 3-Phase
 15 HP
 20" Hg Vacuum
 225 Max. SCFM
 VEP-220 Model
 Skid Mounted 4'x6'
 Air/water separator 60 gallon
 P-1 operates on LSL and LSH
 LSLL, LSHH, and TS shut
 system down

EXISTING VACUUM ENHANCED
PUMPING SYSTEM

FIGURE 5
PROCESS FLOW DIAGRAM



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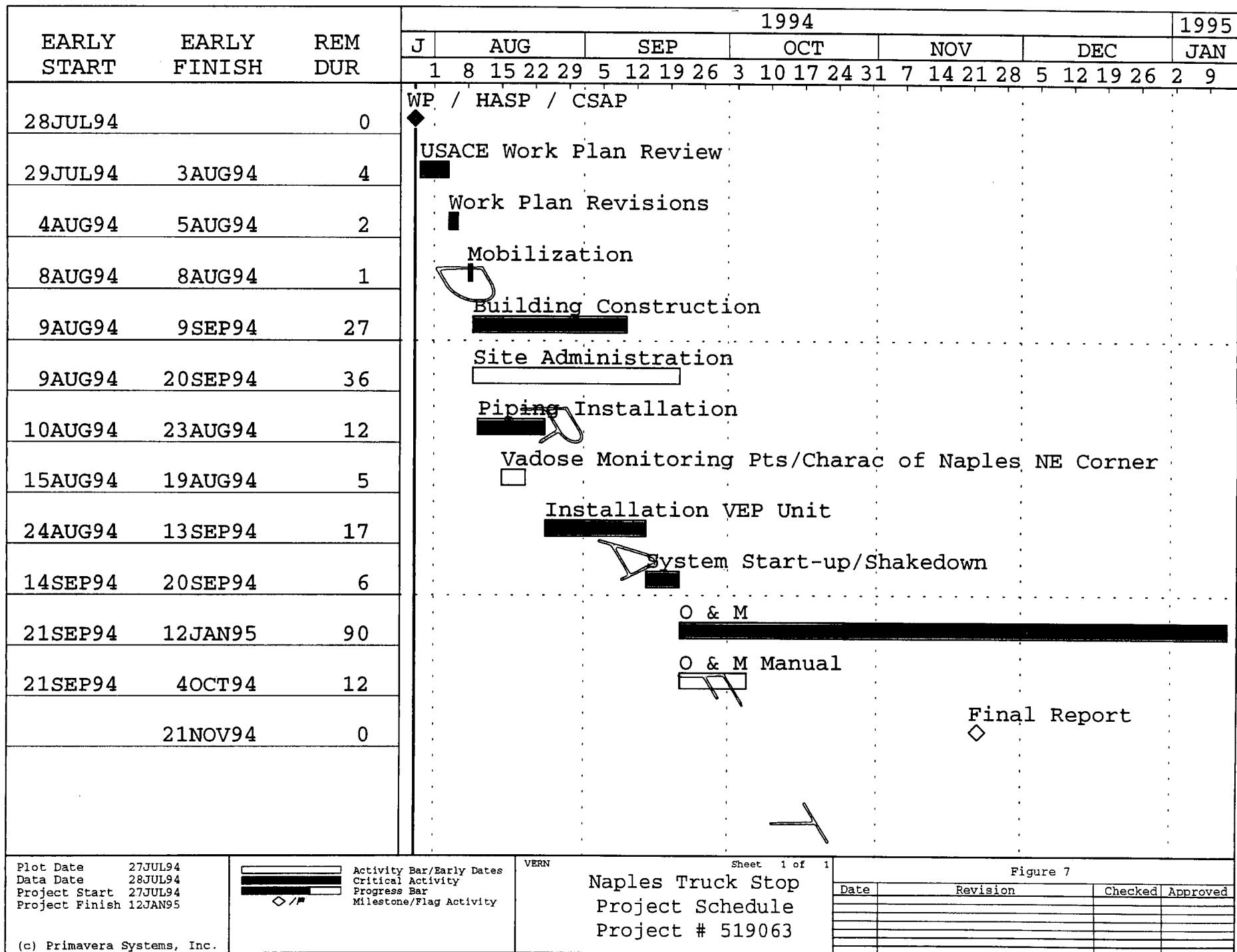
LEGEND:

	Sampling Port		Sediment Filter		Level Switch High High
	Flowmeter		Check Valve		Level Switch High
	Pressure Gauge		Gate Valve		Level Switch Low
	Temperature Sensor		Transfer Pump		Level Switch Low Low
	Threaded Port to Measure Vacuum Pressure		Failsafe Control Cable		

- 480 VAC
- 3-Phase
- 15 HP
- 20" dia Vacuum
- 225 Max. SCFM
- VEP-200 Model
- Skid Mounted 4'x6'
- T-1 200 gallon
- T-2 100 gallon
- P-1 operates on LSL and LSH
- LSL, LSHH, and TS shut system down

PROPOSED VACUUM ENHANCED PUMPING SYSTEM

FIGURE 6
PROCESS FLOW DIAGRAM



**APPENDIX A
SOIL BORING LOGS AND
WELL CONSTRUCTION DIAGRAMS**



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VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: <u>579063</u>	PROJECT NAME: <u>USACE NADLES Truckstop</u> <u>UT</u>		
BORING NUMBER: <u>MW-11</u>	COORDINATES:		DATE: <u>3/5/94</u>
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: <u>3/5/94</u>
ENGINEER/GEOLOGIST: <u>Dave Cochran</u>	Depth	Date/Time	DATE COMPLETED: <u>3/5/94</u>
DRILLING METHODS:	PAGE		OF <u>1</u>

DEPTH ft	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER ()	RECOVERY %	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
				Asphalt 0.5'				
5				Hard, silty clay, moist				
				Hard silty clay with slight petroleum odor, moist 6.0				T
				Very Hard silty clay and cobbles, moist 8.5	F			
10				Hard silty clay, moist				
				A 13.0				
15				Bottom of boring at 13.0'				
				D				

NOTES:

Drilling Contractor _____

Drilling Equipment _____

Driller: _____



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CORPORATION

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: <u>519063</u>	PROJECT NAME: <u>USACE NAP/13 Truckstop</u> <u>UT</u>		
BORING NUMBER: <u>MW-12</u>	COORDINATES:		DATE: <u>3/5/94</u>
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: <u>3/5/94</u>
ENGINEER/GEOLOGIST: <u>Dave Cochran</u>	Depth	Date/Time	DATE COMPLETED: <u>3/5/94</u>
DRILLING METHODS:	PAGE <u>1</u>		OF <u>1</u>

DEPTH (ft)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER ()	RECOVERY (%)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
5				Asphalt 0.5' Hard, light medium brown, silty clay, moist				
				Hard, light medium brown, silty clay with slight petro. odor, moist				T
10				8.5' Cobble layer, moist 9.5'	F			
				Hard, greenish brown, silty clay with scattered cobbles, moist.				
15				Bottom of Boring at 15.0' D				

NOTES:

Drilling Contractor _____

Drilling Equipment _____

Driller: _____

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: <u>519063</u>	PROJECT NAME: <u>USACE Naples Truckstop</u> <u>UT</u>		
BORING NUMBER: <u>MW-13</u>	COORDINATES:		DATE: <u>3/5/94</u>
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: <u>3/5/94</u>
ENGINEER/GEOLOGIST: <u>Dave Cochran</u>	Depth	Date/Time	DATE COMPLETED: <u>3/5/94</u>
DRILLING METHODS:			PAGE <u>1</u> OF <u>1</u>

DEPTH (ft)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER ()	RECOVERY (%)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
				Asphalt. Hard, medium brown, silty clay, moist				T
				8.5 Hard, medium grayish brown, silty clay with scattered cobbles, moist A	F			
				Bottom of boring at 15.0' well set at 13.0' D				

NOTES:

Drilling Contractor _____

Drilling Equipment _____

Driller: _____

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: <u>519063</u>	PROJECT NAME: <u>USACE Naples Truckstop</u> <u>UT</u>		
BORING NUMBER: <u>RW-1</u>	COORDINATES:		DATE: <u>3/6/94</u>
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: <u>3/6/94</u>
ENGINEER/GEOLOGIST: <u>Dave Cochran</u>	Depth	Date/Time	DATE COMPLETED: <u>3/6/94</u>
DRILLING METHODS:			PAGE <u>1</u> OF <u>1</u>

DEPTH (ft)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER ()	RECOVERY (%)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
5				Hard, medium brown, silty sandy clay, moist				T
				8.0		F		
10				Medium dense, grayish brown, clayey silt with sand and cobblestones moist				
				A				
15				Sand, wet				
				Shale, wet				
20				Bottom of Boring at 17.0'				

NOTES:

Drilling Contractor _____

Drilling Equipment _____

Driller: _____



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CORPORATION

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 519063	PROJECT NAME: USACE Naples Truckstop		
BORING NUMBER: RW-2 + RW-3	COORDINATES:		DATE: 3/10/94
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 3/10/94
ENGINEER/GEOLOGIST: Dave Cochran	Depth	Date/Time	DATE COMPLETED: 3/10/94
DRILLING METHODS:	PAGE 1		OF 1

DEPTH (ft)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER ()	RECOVERY ()	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
5				Hard, medium brown, silty sandy clay, moist				T
10				8.0 Medium dens, gray, sh brown clayey silt with sand and cobbles, moist	F			
15				Sand, wet R 15.0 Shale, wet R 17.0				
20				Bottom of boring at 17.0'				

NOTES:

Drilling Contractor _____

Drilling Equipment _____

Driller: _____



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CORPORATION

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 519063	PROJECT NAME: USACE Naples Truckstop UT		
BORING NUMBER: RW-4 & RW-5	COORDINATES:		DATE: 3/10/94
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 3/10/94
ENGINEER/GEOLOGIST: Dave Cochran	Depth	Date/Time	DATE COMPLETED: 3/10/94
DRILLING METHODS:			PAGE 1 OF 1

DEPTH (ft)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER ()	RECOVERY ()	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
5				Hard, medium brown, silty sandy clay, moist				
8.0								
10				Medium dense, grayish brown clayey silt with sand and collicles, moist.	F			
15								
18.0				Sand, wet				
19.0				Shale, wet				
20				Bottom of boring at 19.0'				

NOTES:

Drilling Contractor _____

Drilling Equipment _____

Driller: _____



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CORPORATION

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 519063	PROJECT NAME: Naples Truckstop		DATE: 3/10/94
BORING NUMBER: RW-6	COORDINATES:		DATE STARTED: 3/10/94
ELEVATION:	GWL: Depth	Date/Time	DATE COMPLETED: 3/10/94
ENGINEER/GEOLOGIST:	Depth	Date/Time	PAGE 1 OF 1
DRILLING METHODS:			

DEPTH (ft)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER ()	RECOVERY ()	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
5				Hard, medium brown, silty sandy clay, moist				T
8.0				Medium dense, grayish brown clayey silt with sand and cobbles, moist		F		
10								
15				Sand, wet R				
17.0				Shale, wet				
18.0				Bottom of Boring at 18.0				
20								

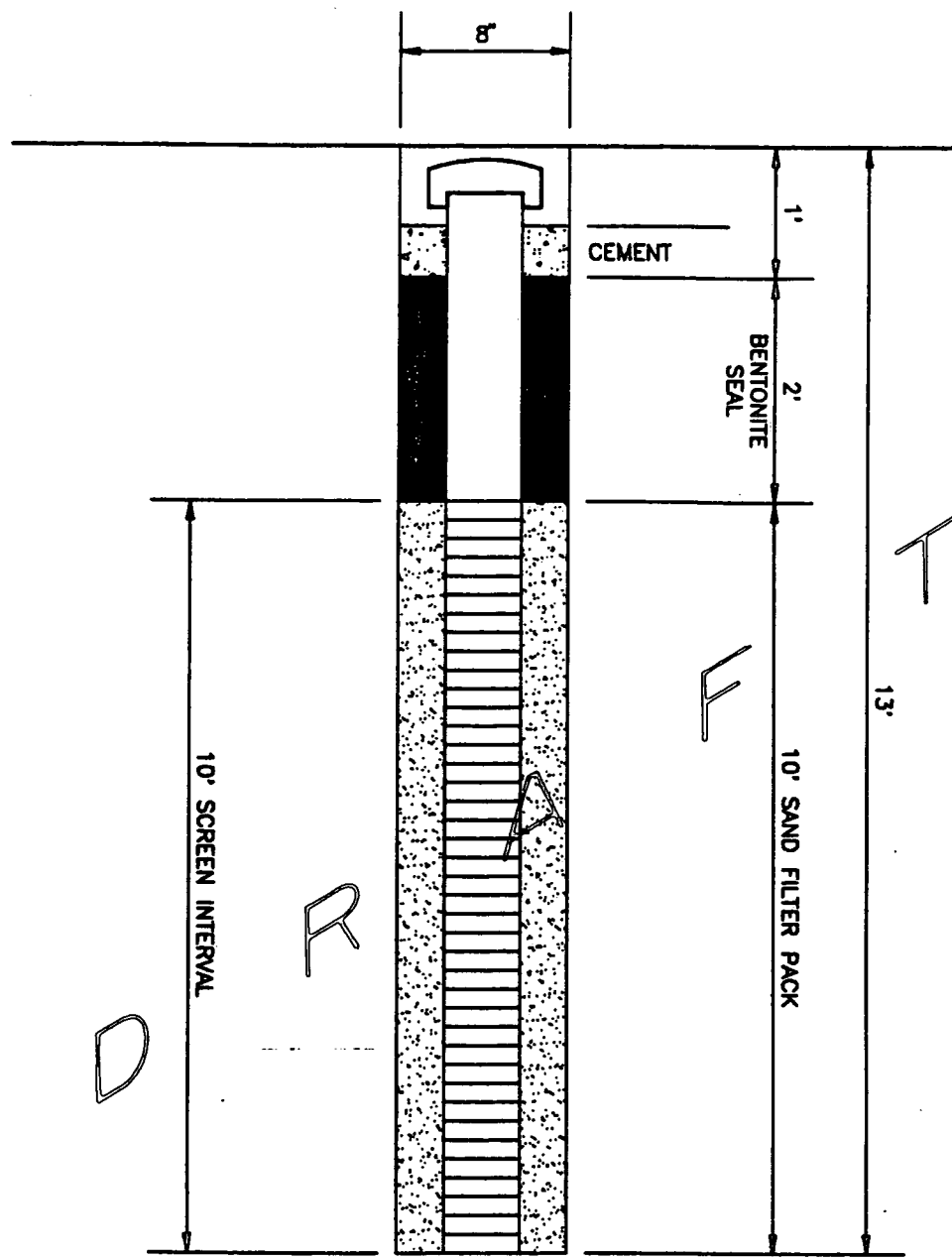
NOTES:

Drilling Contractor _____

Drilling Equipment _____

Driller: _____

DRAWN BY	C.J.B.	CHECKED BY	DRAWING NUMBER
BY		APPROVED BY	



WELL DIAGRAM FOR TYPICAL
 2" PVC WELL
 MW-11
 NAPLES TRUCK STOP
 VERNAL, UTAH
 PREPARED FOR
 ACOG
 VERNAL, UTAH



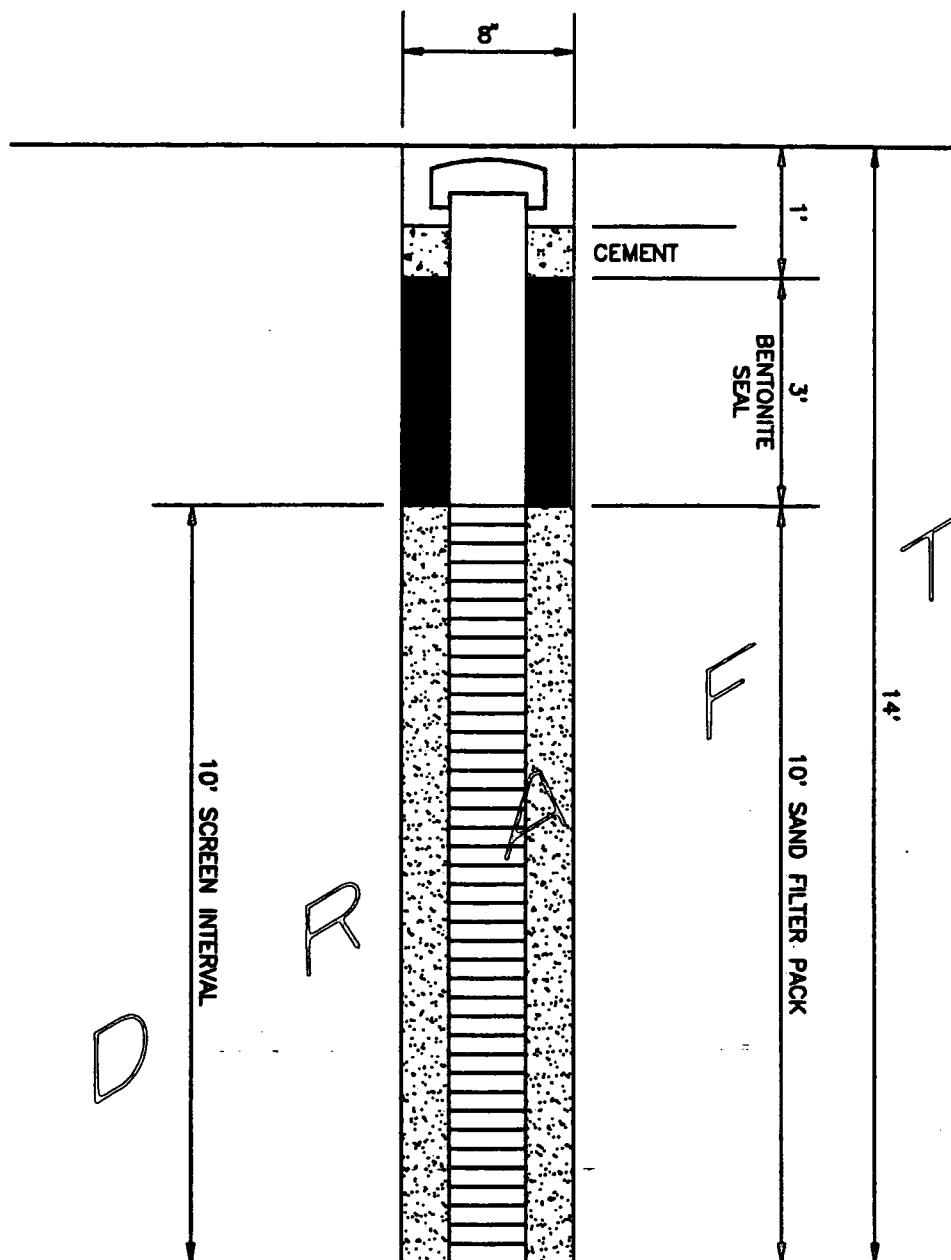
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C.I.B.
04-20-94

DRAWN
BY



WELL DIAGRAM FOR TYPICAL
2" PVC WELL
MW-12
NAPLES TRUCK STOP
VERNAL, UTAH
PREPARED FOR
ACOG
VERNAL, UTAH

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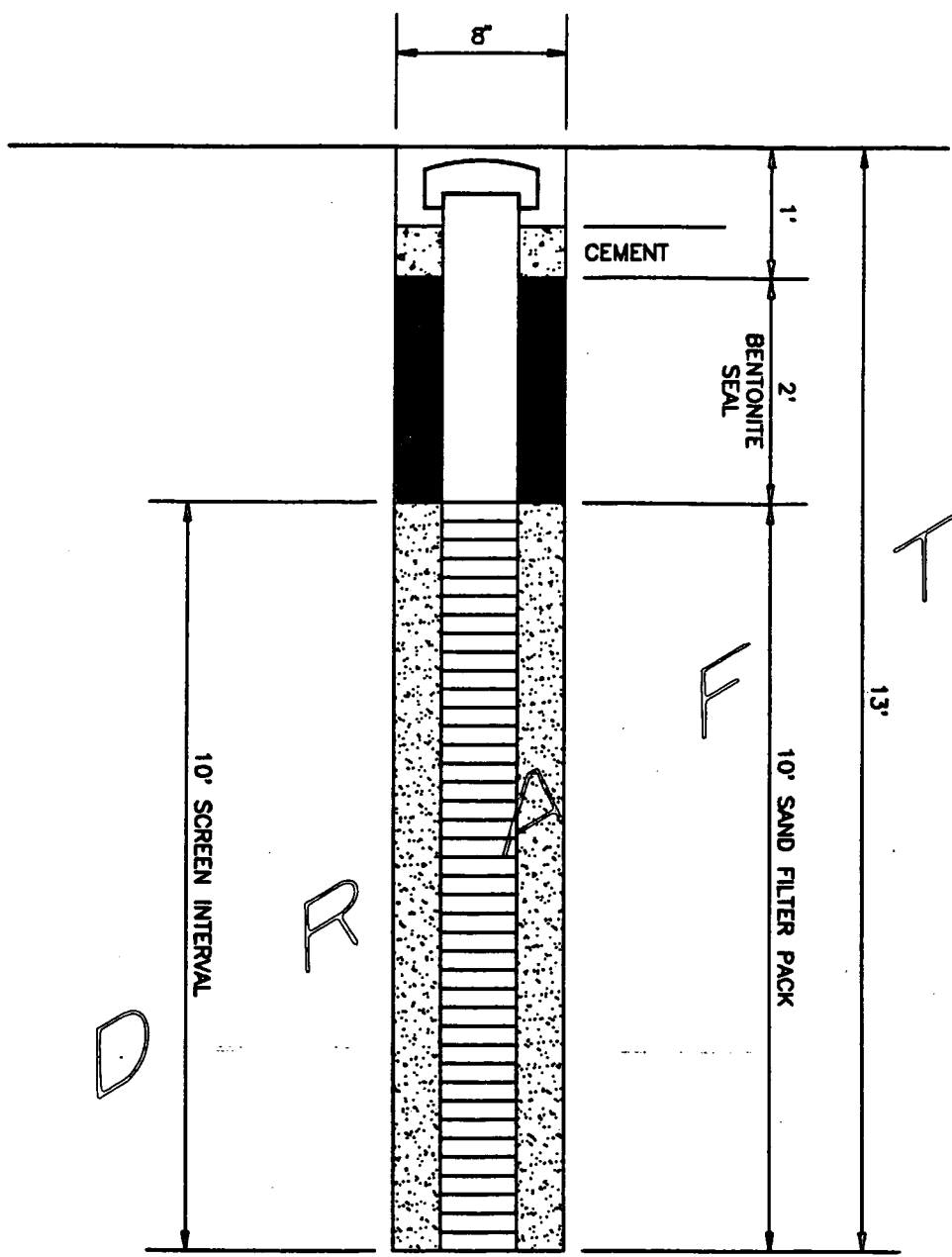
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13-16' AM

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WELL DIAGRAM FOR TYPICAL
2" PVC WELL
MW-13
NAPLES TRUCK STOP
VERNAL, UTAH
PREPARED FOR
ACOG
VERNAL, UTAH



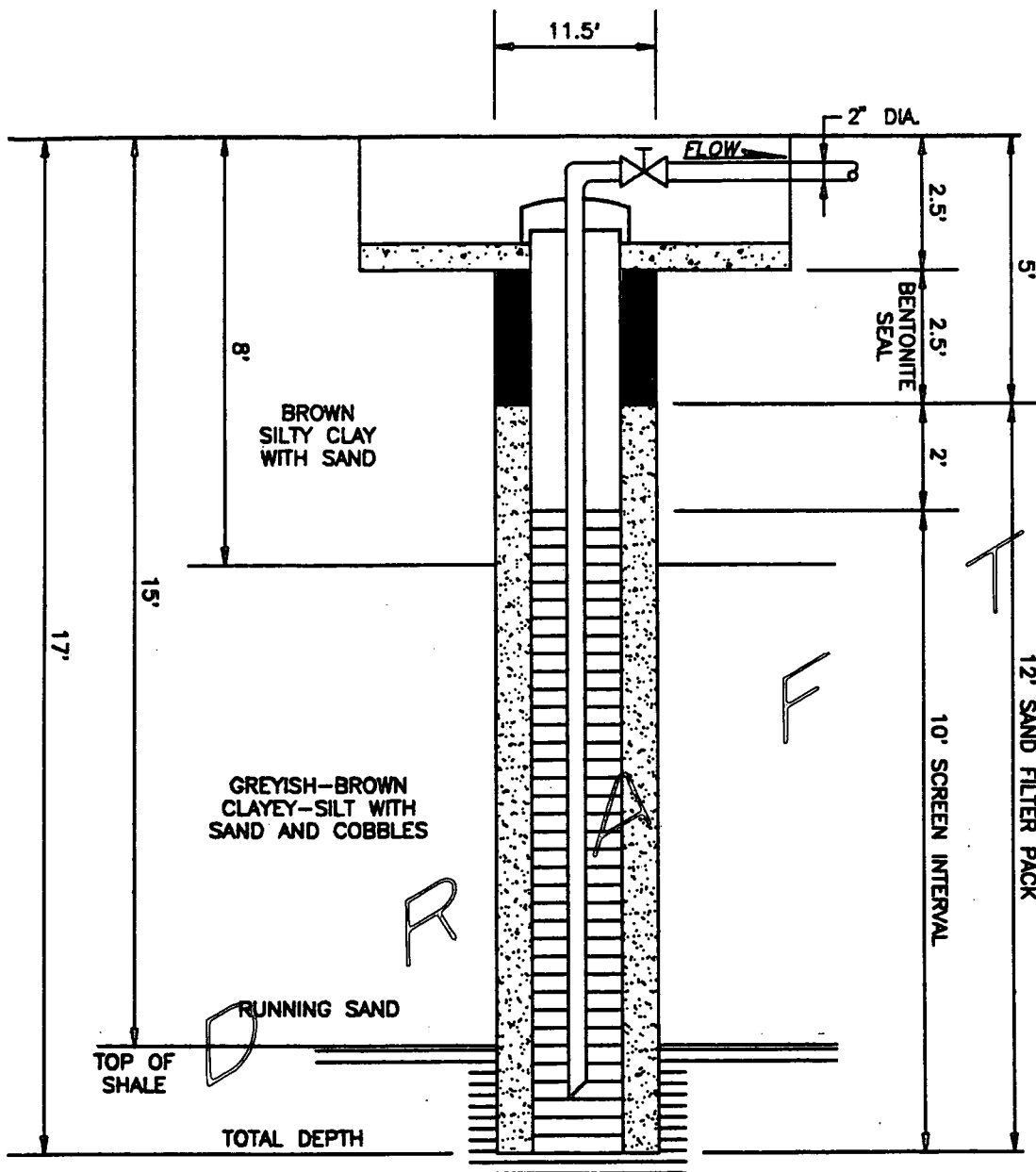
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CHECKED BY

APPROVED BY

C.J.B. 04-20-94

DRAWN BY



NOTES:

1. WELL SCREEN IS 20 SLOT 6" STAINLESS.
2. DEPTH TO SATURATED ZONE-DRILLING STATIC LAYER LEVEL.

WELL DIAGRAM FOR TYPICAL
6" SS WELL
NAPLES TRUCK STOP
VERNAL, UTAH
PREPARED FOR
ACOG
VERNAL, UTAH



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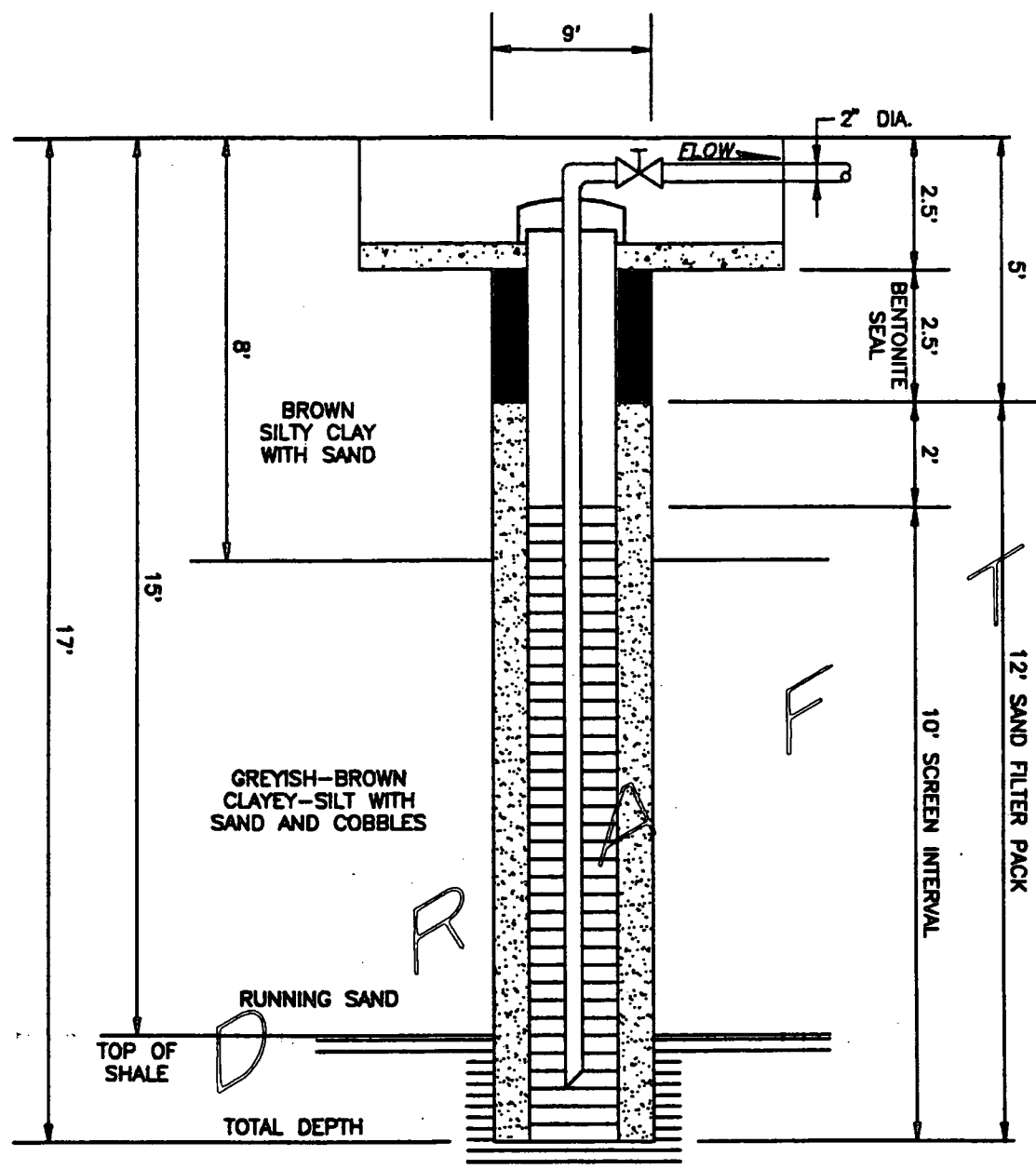
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C.J.B. 04-20-94

DRAWN BY



NOTE:

WELL SCREEN IS 20 SLOT 4" PVC.

**WELL DIAGRAM FOR 4" PVC WELL
RECOVERY WELLS #2 & #3**

NAPLES TRUCK STOP
VERNAL, UTAH

PREPARED FOR

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VERNAL, UTAH



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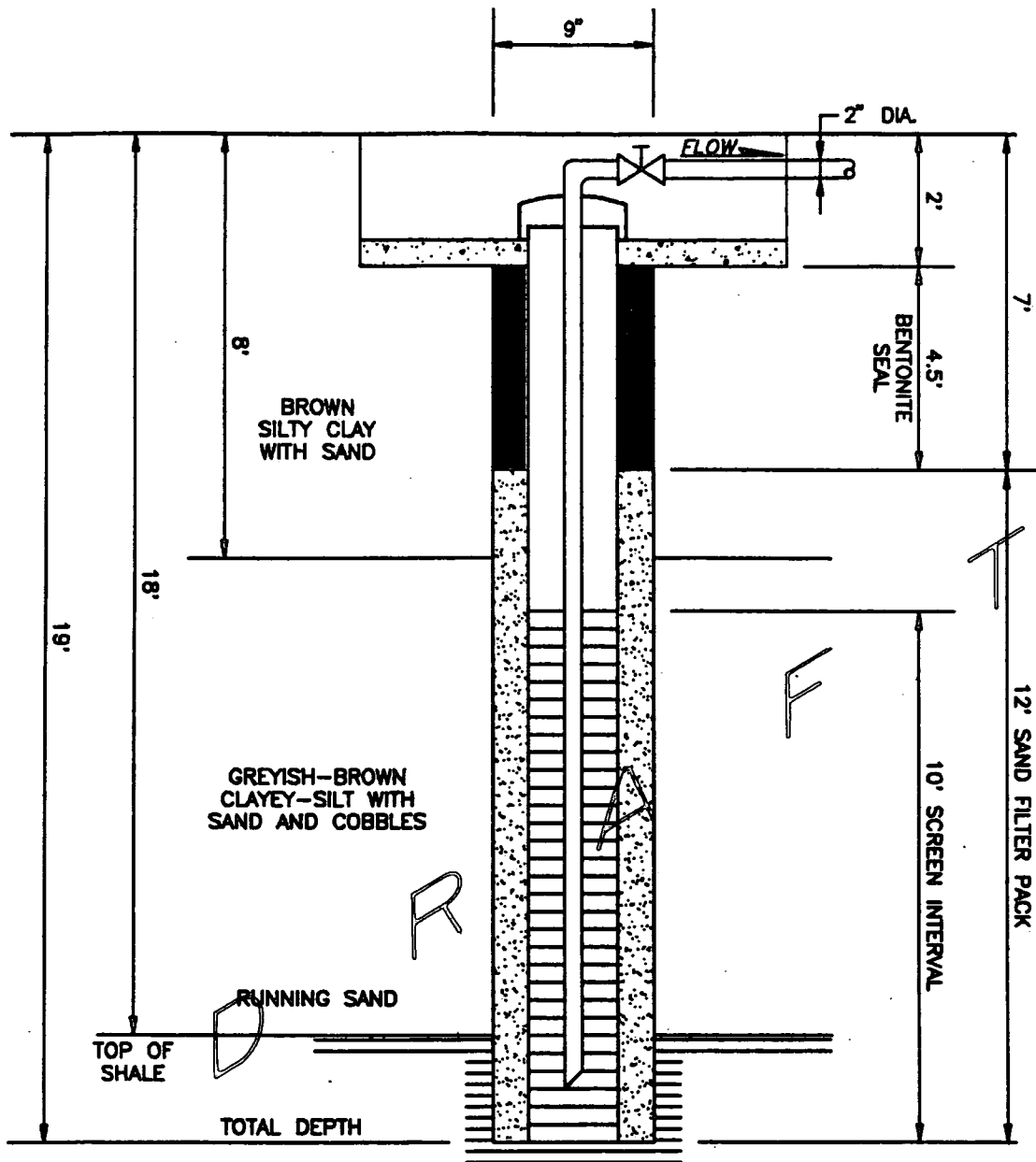
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C.J.B.

04-20-94

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WELL DIAGRAM FOR 4" PVC WELL
RECOVERY WELLS #4 & #5

NAPLES TRUCK STOP
VERNAL, UTAH

PREPARED FOR

ACOG
VERNAL, UTAH

NOTE:

WELL SCREEN IS 20 SLOT 4" PVC.



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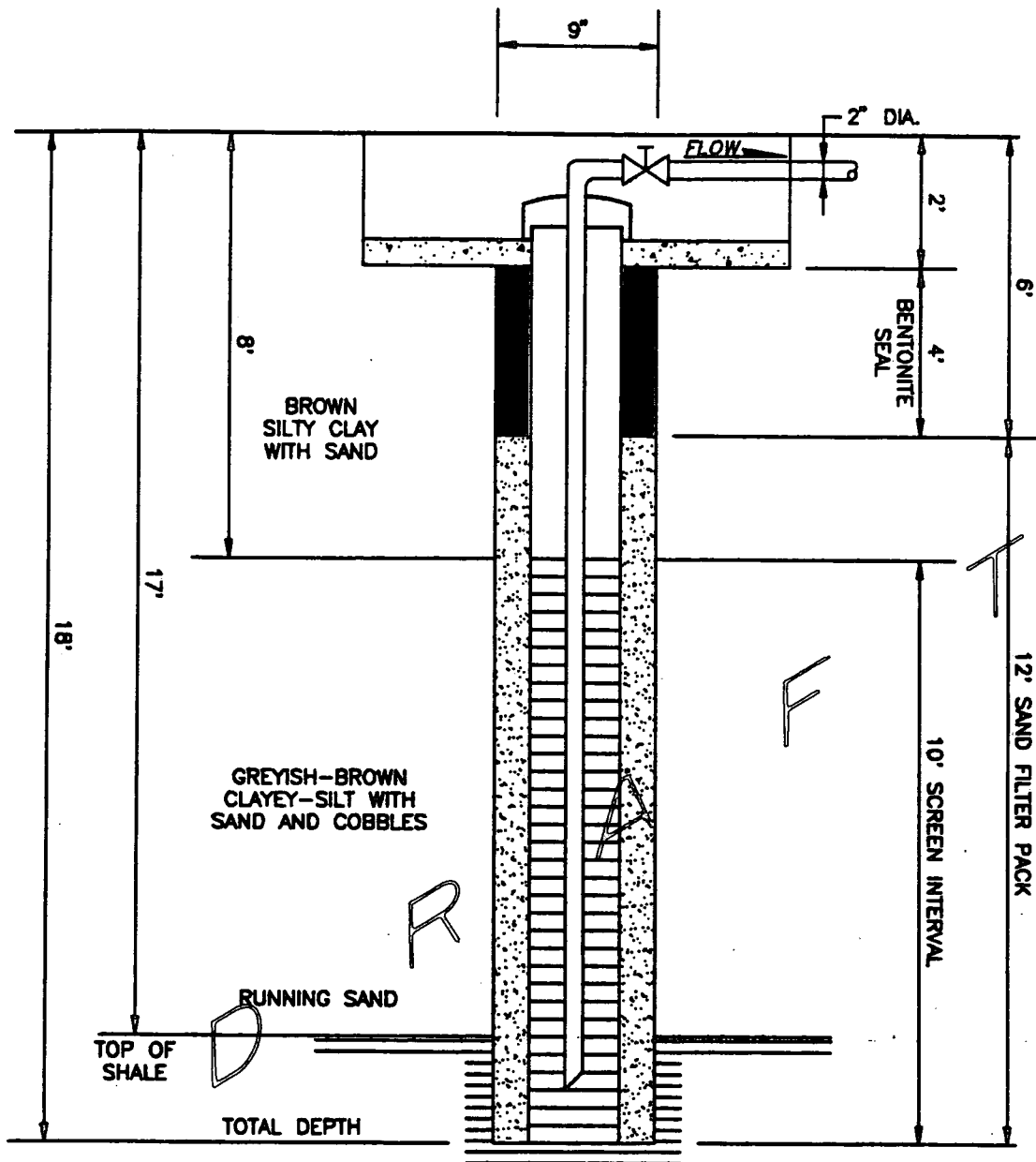
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DRAWING NUMBER 519063-A4

C.J.B. CHECKED BY
04-20-94 APPROVED BY

DRAWN BY



WELL DIAGRAM FOR 4" PVC WELL
RECOVERY WELL #6

NAPLES TRUCK STOP
VERNAL, UTAH

PREPARED FOR

ACOG
VERNAL, UTAH

NOTE:

WELL SCREEN IS 4" PVC 20 SLOT.



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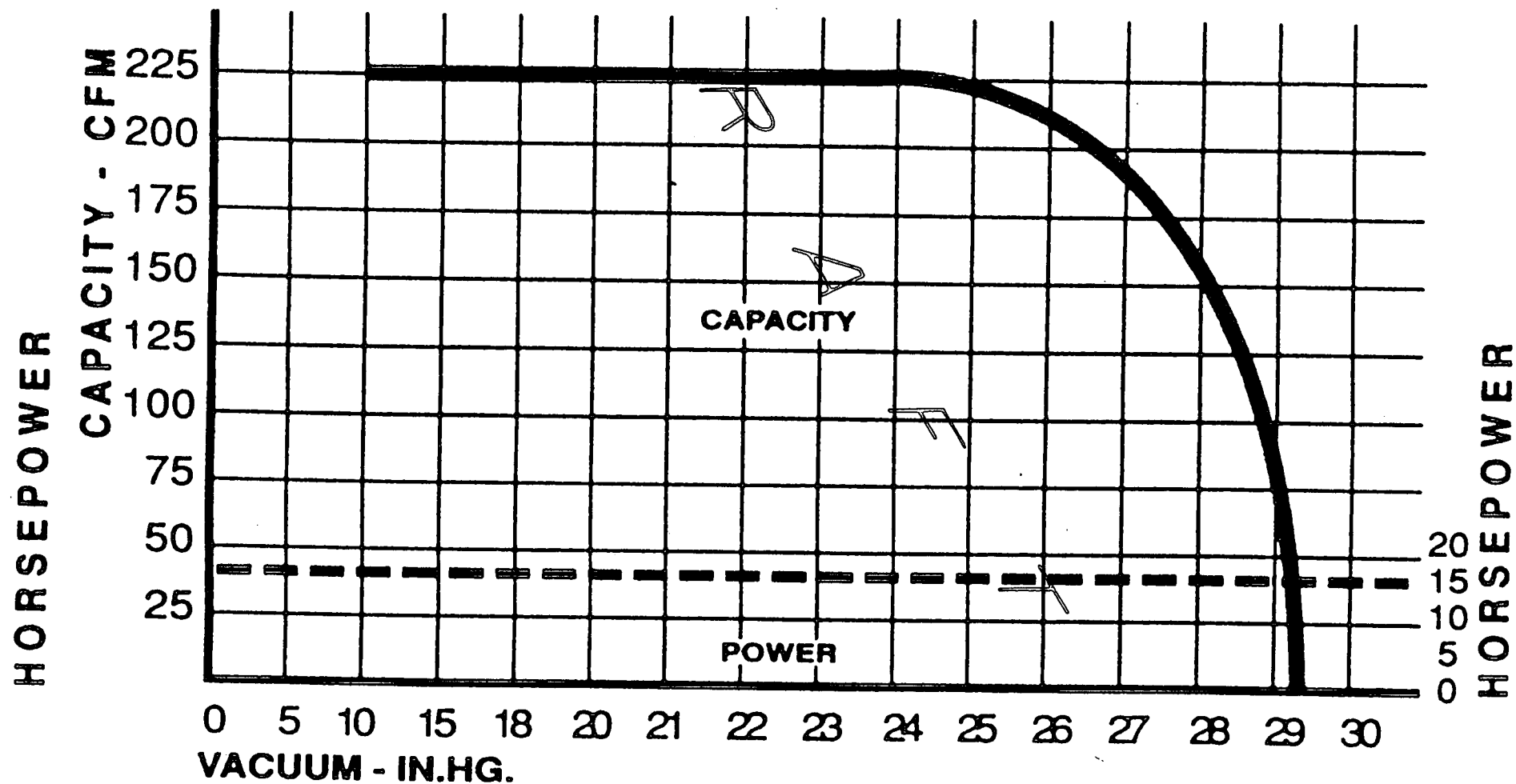
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**APPENDIX B
VACUUM PUMP
MANUFACTURER'S PERFORMANCE CURVE**

MODEL A 200

1150 RPM



APPENDIX C
CONTRACTOR'S SAMPLING AND ANALYSIS PLAN

**CONTRACTOR'S SAMPLING AND ANALYSIS PLAN (CSAP)
ENHANCED SOIL VAPOR EXTRACTION AND
TREATMENT SYSTEM
NAPLES TRUCK STOP
NAPLES, UTAH**

**Contract No. DACW45-90-D-9002
Delivery Order No. 88
IT Project No. 519063**

Prepared by:

**IT Corporation
2790 Mossie Boulevard
Monroeville, Pennsylvania 15146
(412) 372-7701**

Prepared for:

**U.S. Army Corps of Engineers
Omaha District
215 N. 17th Street
Omaha, Nebraska 68102-4978**

JULY 1994

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13.0 Sample Preservation, Packaging, and Shipping	8
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1	Number of Samples and Required Analyses
2	Required Test Methods, Sample Containers, Preservatives, and Maximum Holding Times
3	Data Quality Objectives

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Figure	Title
1	Sample Collection Log
2	Analysis Request and Chain-of-Custody Record

1.0 Introduction

This Contractor's Sampling and Analysis Plan (CSAP) has been prepared in response to the scope of work (SOW) for the Naples Truck Stop Gasoline Spill project in Naples, Utah. The SOW for this project was issued by the U.S. Army Corps of Engineers (USACE) Omaha District, Rapid Response Section and is dated July 13, 1994. This plan will be the governing document for sampling and analysis activities conducted by IT Corporation (IT) as part of the remedial action to be implemented at this site, and provides the following:

- The CSAP provides the methods and procedures manual to be used by IT field personnel and analytical staff as a guide in conducting all sampling and analysis activities
- The CSAP presents formal sampling and analysis documentation to the USACE and the representatives for their review and approval
- The CSAP is the basis for ensuring the quality assurance/quality control (QA/QC) of all analytical results obtained during this project.

The collection, handling, and analysis of soil, air, and water samples will be addressed in this CSAP. Neither sampling nor analysis will proceed without the prior approval of the USACE.

2.0 Scope

The SOW for this project involves the following sampling and analysis:

- Analysis of extracted groundwater and air samples for benzene, toluene, ethyl benzene, and xylene (BTEX) compounds to assess current conditions of the site.
- Analysis of effluent from bioremediation (or alternate) treatment system for BTEX and total recoverable petroleum hydrocarbons (TRPH) to evaluate performance.
- Analysis of groundwater extracted from existing monitoring wells to determine overall recovery system performance.
- Treated groundwater analysis for TRPH prior to discharge to the local publicly owned treatment works (POTW) system.

Based upon final treatment system chosen for project, the number of samples per sample event may vary.

The samples sent for off-site analysis will be sent to the following laboratories:

- Water and Soil Samples: Quantera Environmental Services
5307 Industrial Oaks Boulevard
Suite 160
Austin, Texas 78735
(512) 892-6684
- Air Samples: Quantera Environmental Services
5815 Middlebrook Pike
Knoxville, Tennessee 37921
(615) 588-6401

The samples for this project will not be subcontracted to another laboratory without prior written approval from the USACE.

3.0 Project Organization

The project organization is designed to efficiently complete the tasks outlined by the SOW. Sample management will be the joint responsibility of the Site Supervisor and Project Manager. Sample management involves tracking of samples from the time of collection through the reporting of analytical results, and knowing the status of each sample at all times.

Actual sample collection will be handled by the Site Supervisor or his designee. The Site Supervisor is responsible for sample collection, labeling, documentation, packaging, and shipment or transfer to the designated laboratory.

Once sample results are available from the laboratory, the IT Project Manager along with the laboratory project manager will review the data before presenting it to the USACE representative. Using these data, all parties will determine the appropriate course of action, if any.

4.0 Sampling Procedures and Methodologies

All soil, water, and air sampling, sample documentation, and decontamination of equipment will be performed in a manner consistent with the most recent U.S. Environmental Protection Agency (EPA) guidelines as outlined in SW-846; the USACE guidance document ER 1110-1-263, Appendix "E", dated October 1, 1990; and any state of Utah requirements.

All sample volumes, containers, and preservatives will meet or exceed analytical requirements of the approved methods utilized for obtaining the project objective.

Analytical requirements are detailed in Table 1. The analytical methods and data quality objectives are shown in Table 3.

4.1 Soil Samples

Soil samples will be collected at various depths from a soil boring in order to characterize the Naples Truck Stop northeast property corner and analyzed for parameters listed in Table 1. Samples will be collected by split spooning down hollow stem augers. The number of samples collected will be determined in the field based upon the potential presence of hydrocarbons.

4.2 Air Samples

Air samples will be collected at the influent and effluent of the treatment system. The number of samples per sample event will vary based upon the final treatment method selected. The air samples will be collected using a stainless steel SUMMA™ canister. Samples will be analyzed for parameters listed in Table 1.

4.3 Water Samples

Water samples will be collected from the existing monitoring wells and from various locations of the final treatment system. The samples will be analyzed for parameters listed in Table 1.

5.0 Sample Labeling

All samples taken in the field will be properly identified by using a sample label affixed to the sample bottle. Sample labels will be filled in with waterproof black ink and must include the following at a minimum:

- Unique sample identification (ID) number
- Date and time of sample collection
- Sample location
- Required analysis
- Preservatives added, if any
- Name/initials of the collector
- Designation of "grab" or "composite" sample.

Sample labels will be completed for each container of each sample just before collection and will be affixed to each container before being filled, sealed, and wiped clean. The jar will then be placed into a ziplock bag.

Where possible, sample containers will carry the same unique number on the side of the sample container (bottle, vial, or jar) and on its lid. Fractions of the same sample will carry the same unique sample number (i.e., fractions for volatiles, metals, and toxicity characteristic leaching procedure [TCLP] analyses).

6.0 Sample Collection Log Form

Each sample will be recorded on a project-specific sample collection log sheet (Figure 1) to include, at a minimum, the following information:

- Project name and number
- Sample ID number
- Date and time sample taken
- Sample location
- Sample type (i.e., soil or water)
- Field volatile screening results (HNU)
- Sample volume and containers
- Documenter's name/initials.

These logs will be completed by the sample collection technician and will remain as loose sheets to be transferred to the Site Supervisor subsequent to sample collection. They will provide the necessary information for tracking and documenting sample collection while other sampling operations continue. Using a preprinted form instead of a bound log book makes it faster and easier for field personnel to document the sampling effort. The project-specific form prompts field personnel to ensure that all necessary information is documented. All sample logs will be maintained in a three-ring notebook and sequentially numbered. Individual forms are more easily copied and are less likely to be damaged because they are not continually in the field. The original sample collection logs will be bound upon completion of the project. An example of this form is presented at the end of this section.

7.0 Analysis Request and Chain-of-Custody Record

An Analysis Request/Chain-of-Custody (AR/CC) Record will be maintained for all samples collected during this project. This form documents who has custody of the sample from the time of collection through the analytical process, and is also used to communicate to the laboratory the required analyses. An AR/CC Record will be completed for every cooler to be shipped off site, and will be sealed in a ziplock bag and taped to the inside of the lid of the cooler. An example of the AR/CC form (Figure 2) is presented at the end of this section.

When transferring the possession of samples, the individuals relinquishing and receiving Federal Express will sign, date, and note the time on the record. This record documents sample custody transfer from the sampler, usually through another person or persons, to the analytical laboratory. Once samples are shipped off site they are subsequently tracked using the Master Sample Log.

Possession of samples collected or prepared in the field must be accountable from the time collected/prepared until disposal. Chain-of-custody records are used to attest to a sample being in a person's custody under the following criteria:

- It was in physical possession
- It was maintained in view after being in possession
- It was in physical possession and then transferred to a designated secure area and/or relinquished to an express delivery firm.

Under no circumstances shall samples be left unattended by the sample technician prior to shipment unless the samples are in a locked/secure environment.

8.0 Master Sample Log

All samples will be tracked by the Site Supervisor on a Master Sample Log. The Master Sample Log will contain the following information:

- Sample number
- Date sample was collected
- Sample matrix
- Sample location

- Required analyses
- Date shipped
- QC (indicating what type of QA/QC sample)
- AR/CC Record number
- Name of laboratory performing the analysis
- Date results due
- Date results received
- Additional comments.

The Master Sample Log may be used in conjunction with a personal computer (PC) to easily update the log and to provide daily printouts for the status of all samples. Using the PC, the sample log can be extended to include analytical summary results as well.

9.0 Field Quality Assurance and Quality Control Samples

QA and QC samples will be analyzed for the purpose of assessing the quality of the sampling effort and the resulting analytical data. Field QA and QC samples may include splits or replicates of field samples, and trip blanks will be collected for submittal to the off-site laboratory. The identity of the samples will be withheld from the analysts and laboratory personnel until data are reported. The purpose of these "blind" samples is to provide checks to evaluate both the quality of the sampling procedures and the off-site analytical laboratory. QC samples will be sent to the contract laboratory for analysis.

10.0 List of Field Sampling, Equipment, Containers, and Supplies

The following sampling equipment, decontamination supplies, and sample containers will be required for this project:

- Water/Soil Sampling:
 - Precleaned sample jars with Teflon™-lined lids
 - Precleaned stainless steel disposable spoons
 - Stainless steel mixing bowls
 - Nonphosphate laboratory detergent
 - Isopropanol
 - Deionized water
 - Disposable wiping cloths.

- Air Sampling:
 - Stainless steel SUMMA™ canister
- General:
 - Shipping coolers
 - Coolant
 - Packing material
 - Sample bottle labels
 - AR/CC forms
 - Tap water
 - Brushes
 - Log books
 - Drum/sample logs
 - Custody seals
 - Camera with film
 - Ziplock bags.

All sampling equipment will be constructed of stainless steel or Teflon™ where possible. Otherwise, sampling equipment will be constructed of materials that will not interfere with any intended analysis parameter. Also, where possible, sampling materials and equipment will be expendable to reduce decontamination efforts and the potential for cross contamination of samples.

11.0 Sample Equipment Decontamination

All reusable sampling equipment will undergo decontamination before its initial use on site and between each use at distinct sample locations. These procedures are necessary to prevent or minimize the introduction of cross contamination between distinct sample points.

Decontamination will take place in a designated area with a means to containerize any waste decontamination liquid. The decontamination area will be located close to a defined exclusion zone on site.

Decontamination procedures for sampling equipment will be as follows:

- Equipment will be washed thoroughly with nonphosphate laboratory detergent and potable water, using plastic or metal brushes to remove any particulate matter or surface film
- The equipment will be rinsed with potable water

- Rinse equipment thoroughly with organic-free deionized water
- Rinse equipment once with pesticide grade isopropanol and allow to air dry, if possible
- Rinse equipment with organic-free deionized water and allow to dry (Teflon™ equipment only)
- Wrap equipment with aluminum foil.

All liquids generated during the decontamination procedures will be collected, containerized, and appropriately labeled for disposal or incorporated with the water to be treated. All waste liquids will be stored on site until a determination of potential hazard class and necessary arrangements for final disposition are made.

12.0 Sample Containers

Sample containers and caps will be new, precleaned containers made of material(s) recommended by the EPA in accordance with Office of Solid Waste and Emergency Response (OSWER) Directive 9240.0-05A. The sample containers to be used on this project are presented in Table 2.

13.0 Sample Preservation, Packaging, and Shipping

Samples will be collected in appropriate containers and preserved according to procedures summarized in Table 2. Sample holding times stated in the approved analytical methods will always be met.

Samples will be packed and shipped in accordance with all EPA, USACE, and state of Utah guidelines. USACE guidelines are outlined in the document labeled "Sample Handling Protocol for Low, Medium, and High Concentration Samples of Hazardous Waste" (ER 1110-1-263, Appendix "E", October 1, 1990). The samples will be considered low level environmental samples for packaging and shipping purposes.

Samples will be placed in coolers as soon as possible after collection and packed with an inert absorbent material (Bubble Wrap or Peanuts). Samples will be cooled to a temperature of approximately 4 degrees Celsius (°C) and maintained at that temperature by means of

refrigeration or ice until it is received at the laboratory. All ice will be double bagged for shipment. Preservatives, if required, will be added to the samples the same day they are collected. Samples will be repacked at the end of the day and shipped for next day delivery to the laboratory when possible. Notification of shipment will be telephoned to the laboratory the day of sample collection. No samples will be held on site for more than 24 hours.

Before coolers filled with samples are shipped, two custody seals will be affixed to the outside lid edge on opposite sides to verify a tamper-free shipment. The custody seals will be covered with clear packing tape, and their condition checked upon receipt of coolers by the laboratory.

14.0 Sample Handling, Tracking, and Data Management

When samples are received at the contract laboratory, the laboratory will complete the section on the AR/CC Record marked "Condition on Receipt" for all sample shipments. This will allow for noting problems in sample packaging, chain of custody, and sample preservation.

Sample tracking will be accomplished by using Sample Collection Logs, AR/CC Records, and a Master Sample Log. The information included in these tracking tools and their proper use are discussed in Sections 7.0, 8.0, and 9.0, respectively.

Data generated on site will be turned over at least weekly to the USACE site representative for distribution to the USACE-Rapid Response Chemist. Analytical data validation for this project will be performed by the laboratory as sample analysis is completed. Data will be reported according to USACE requirements listing the analytes and their results. Raw data will not be provided in report packages. Sample results will be calculated on a dry weight basis.

15.0 Sample Disposal

Samples collected at this site and shipped to the analytical laboratory will remain there until it is determined that no further analysis will be required. At this time, the samples will be disposed by the laboratory or packaged and shipped back to the sampling site in accordance with the USACE guidelines outlined in "Engineering Design, Chemical Data Quality Management for Hazardous Waste Remedial Activities," Appendix "F", October 1990. Once

samples are received back at the site, they will be placed in containers, labeled, and stored for final disposition.

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TABLES

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Table 1
Number of Samples and Required Analyses
Naples Truck Stop
Naples, Utah

Samples	Matrix	Analyses									
		System Monitoring/ Discharge Monitoring		Water Quality							
		BTEX ^a	TPH-G ^b	Metals ^c	Cations/ Anions ^d	Alkalinity ^e	Oil and Grease ^f	Total, Suspended, and Dissolved Solids ^g	Hardness ^h	COD	PAH ⁱ
Monitoring Wells	Water	30	0	0	0	0	0	0	0	0	0
Treatment System Influent	Water	10	0	2	2	2	2	2	2	2	0
Treatment System Influent	Air	5	0	0	0	0	0	0	0	0	0
Treatment System Effluent	Water	10	10	0	0	0	0	0	0	0	0
Treatment System Effluent	Air	2	0	0	0	0	0	0	0	0	0
Naples Northeast Corner	Soil	2	0	0	0	0	0	0	0	0	2

Note: Total number of samples collected may vary based upon final treatment system selected and actual performance.

BTEX = Benzene, toluene, ethyl benzene, xylene

COD = Chemical oxygen demand

PAH = Polynuclear aromatic hydrocarbons

TDS = Total Dissolved Solids

TPH-G = Total petroleum hydrocarbons-gasoline range

^a Method 8020.

^b EPA Method 8015 Modified.

^c Lead: EPA SW-846 Method 7421 or 6010

Arsenic: EPA SW-846 Method 7060 or 6010

Mercury: EPA SW-846 Method 7470

^d Barium, chromium, cadmium, silver, iron, calcium, manganese, sodium: EPA SW-846 Method 6010.

^e Sulfate, chloride, phosphate: EPA 600 Method 300.0

^f Nitrate/nitrite: EPA 600 Method 353.2 (or 353.1, 353.3).

^g EPA 600 Method 310.1.

^h EPA 600 Method 413.2.

ⁱ Total solids: EPA 600 Method 160.3

Suspended solids: EPA 600 Method 160.1

Dissolved solids: EPA 600 Method 160.2.

^h EPA 600 Method 130.2

ⁱ EPA Method 8100

Table 2
Required Test Methods, Sample Containers, Preservatives, and Maximum Holding Times
Naples Truck Stop
Naples, Utah

Sample Type/Analysis	Test Method ^a	Container	Preservative	Maximum Holding Time
Soil				
BTEX	8020	4-oz. glass jar	Cool, 4°C	14 days
PAH	8100	8-oz. glass jar	Cool, 4°C	14 days
Water				
BTEX	602	2 40-mL glass vials	Cool, 4°C; HCl pH <2	14 days
TPH-G	8015	1 liter amber glass jug	Cool, 4°C; H ₂ SO ₄ pH <2	14 days
Metals	6010, 7470	500-mL plastic jar	Cool, 4°C; HNO ₃ pH <2	28 days
Cations/anions	300.0/353.2	500-mL plastic jar	Cool, 4°C; H ₂ SO ₄ pH <2	28 days
Alkalinity	310.1	250-mL plastic jar	Cool, 4°C	14 days
TDS	160.1	250-mL plastic jar	Cool, 4°C	7 days
Oil and grease	413.2	1 liter glass jar	Cool, 4°C; H ₂ SO ₄ pH <2	14 days
Total, suspended, and dissolved solids	160.3, 160.2, 160.1	250-mL plastic jar	Cool, 4°C	7 days
Hardness	130.2	250-mL plastic jar	Cool, 4°C	28 days
COD	410.1	250-mL plastic jar	Cool, 4°C; H ₂ SO ₄ pH <2	28 days
Soil Vapor				
BTEX	TO-14	6 Liter stainless steel SUMMA™ canister	None	28 days

^a Test methods are EPA methods unless otherwise noted.

Table 3
Data Quality Objectives
Naples Truck Stop
Naples, Utah

Method No.	Matrix	Analyte	Precision ^a (% RSD)	Accuracy ^a (% R)	Detection Limits ^b (µg/L)
EPA 8020	Soil/Water	BTEX	34	32 - 160	5
EPA 8015	Soil/Water	TPH-G	ND	ND	1,000
EPA 6010, 7470	Water	Metals	20	± 25	100
EPA 300.0/353.2	Water	Cations/Anions	20	± 25	5,000
EPA 310.1	Water	Alkalinity	20	± 25	10,000
EPA 160.1	Water	TDS	NA	NA	10,000
EPA 413.2	Water	Oil and Grease			
EPA 160.3, 160.2, 160.1	Water	Total, Suspended, and Dissolved Solids	33	NA	4,000
EPA 130.2	Water	Hardness			
EPA 410.1	Water	COD	20	± 25	25
TO-14	Vapor	VOCs	20	± 25	Compound-specific
EPA 8100	Soil	PAH			

RSD = Relative standard deviation.

R = Recovery.

ND = Not determined.

NA = Not applicable.

^a Precision and accuracy goals are EPA proposed guidelines.

^b Detection limits are highly matrix dependent and may not always be achievable.

FIGURES

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ANALYSIS REQUEST AND CHAIN OF CUSTODY RECORD*

Reference Document No. 5716
Page 1 of

Project Name/No. 1
Sample Team Members 2
Profit Center No. 3
Project Manager 4
Purchase Order No. 6
Required Report Date 11

Samples Shipment Date 7
Lab Destination 8
Lab Contact 9
Project Contact/Phone 12
Carrier/Waybill No. 13

Bill to: 5

Report to: 10

ONE CONTAINER PER LINE

Sample Number 14	Sample Description/Type 15	Date/Time Collected 16	Container Type 17	Sample Volume 18	Pre-servative 19	Requested Testing Program 20	Condition on Receipt 21	Disposal Record No. 22

Special Instructions: 23

Possible Hazard Identification: 24

Non-hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☐ Unknown ☐

Sample Disposal: 25

Return to Client ☐ Disposal by Lab ☐ Archive (mos.)

Turnaround Time Required: 26

Normal ☐ Rush ☐

QC Level: 27

I ☐ II ☐ III ☐ Project Specific (specify):

1. Relinquished by 28
(Signature/Affiliation)

Date:
Time:

1. Received by 28
(Signature/Affiliation)

Date:
Time:

2. Relinquished by
(Signature/Affiliation)

Date:
Time:

2. Received by
(Signature/Affiliation)

Date:
Time:

3. Relinquished by
(Signature/Affiliation)

Date:
Time:

3. Received by
(Signature/Affiliation)

Date:
Time:

Comments: 29

White: To accompany samples

Yellow: Field copy

* See back of form for special instructions.

APPENDIX D
SITE SAFETY AND HEALTH PLAN

**Site Safety and Health Plan
Enhanced Soil Vapor Extraction/Treatment
Naples Truck Stop Gasoline Spill
Vernal, Utah**

**Contract No. DACW45-90-D-9002
Delivery Order No. 88
IT Project No. 519063**



**2790 Mossidae Boulevard
Pittsburgh, Pennsylvania 15146
(412) 372-7701**

R

Prepared for:

**U.S. Army Corps of Engineers
Omaha District
215 N. 17th Street
Omaha, Nebraska 68102-4978**

D

**Adopted By: _____
IT Corporation's Site Supervisor**

Date: _____

**Adopted By: _____
IT Corporation's Safety and Health Manager**

Date: _____

**Adopted By: _____
USACE Representative**

Date: _____

**Naples Truck Stop
Health and Safety Plan Approvals**

Health and Safety Plans require specific approvals as described below. Note that all plans require the approval of a degreed H&S professional.

Category

Approvals

Level A PPE, IDLH, Variance
from corporate procedures,
special circumstances.

Project Manager,
Project/Location H&S Staff,
Region/Division H&S Manager,
Corporate Director H&S, CIH.

Level B PPE.

Project Manager,
Project/Location H&S Staff,
Region/Division H&S Manager
(or designee), CIH.

Level C or D PPE.

Project Manager,
Project/Location H&S Staff.

Approvals

I have read and approved this HASP with respect to project hazards, regulatory requirements, and IT procedures (please indicate if CIH).

Project Manager/Date

Project/Location H&S Staff/Date

Region/Division H&S Manager/Date

Corporate Director H&S/Date

Form HS052

I have been informed of, and will abide by the procedures set forth in the Site Safety and Health Plan and its Amendments for the Naples Truck Stop site.

Date

A handwriting practice sheet for uppercase letters. The sheet is divided into five columns, each containing a set of four horizontal lines (top, midline, baseline, and descender line). The letters D, R, A, F, and T are written in a simple, outlined style on their respective sets of lines. The letter D is on the first set of lines, R on the second, A on the third, F on the fourth, and T on the fifth.

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1.0 Introduction

1.1 Objectives

This Site Safety and Health Plan (SSHP) describes the health and safety (H&S) guidelines developed to protect on-site personnel, visitors, and the public from physical harm and exposure to hazardous materials at the Naples Truck Stop site. The procedures and guidelines contained herein were based upon the best available information at the time of the plan's preparation. Specific requirements may be revised if new information is received or conditions change. A written amendment will document all changes made to the plan. Where appropriate, specific Occupational Safety and Health Administration (OSHA) standards or other guidance documents will be cited and applied. This document and amendments to it will be made available to the Contracting Officer (CO).

All site operations will be performed in accordance with applicable state, local and IT Corporation (IT) corporate regulations and procedures, OSHA requirements, and U.S. Army Corps of Engineers (USACE) requirements. All IT employees and subcontractors must comply with the requirements of this plan.

1.2 Site Description and Contamination Characterization

The Naples Truck Stop is located in Naples, Utah between 1500 South and 1700 South Streets, and 1500 East (Highway 40) and 1700 East Streets. The facility is an operating truck stop, gasoline station, and restaurant.

An unleaded gasoline release occurred from an underground pipeline connecting an aboveground storage tank to the fuel pumps. Initial estimates approximate the volume of gasoline lost at between 7,000 and 10,000 gallons. Due to the direction of the groundwater flow in the area and the geologic strata at the site, the plume has migrated to the southeast and has encroached upon the Questar Pipeline property at 1601 East 1700 South Street.

Phase I activities at the site included the installation of monitoring/recovery wells, the installation and operation of a vacuum extraction unit, the backfilling of an existing trench, asphalt patching, and associated activities. The intent of Phase I was to put an interim recovery and treatment system in place to initiate cleanup of the gasoline spill.

Phase II of this project is to include the final remediation effort required to clean the site of the released gasoline. The activities to be accomplished during this phase include the construction of a concrete block building to house the remediation system components, the installation of a second vacuum extraction unit, the operation of a biological treatment system, sampling and analytical requirements, and the operation and maintenance of the entire system.

1.3 Policy Statement

It is the policy of IT to provide a safe work environment for all its employees. IT considers no phase of operations or administration to be of greater importance than injury and illness prevention. Safety takes precedence over expediency or shortcuts. At IT, we believe every accident and every injury is preventable. We will take every reasonable step to reduce the possibility of injury, illness, or accident.

This SSHP prescribes the procedures that must be followed during the activities at the Naples Truck Stop site. Operational changes which could affect the H&S of personnel, the community, or the environment will not be made without the prior approval of the IT project manager (PM), and the SSHO.

The provisions of this plan are mandatory for all IT personnel and subcontractors assigned to the project. IT requires all visitors to the work site to abide by the requirements of the plan.

1.4 References

This SSHP complies with applicable OSHA and the U.S. Environmental Protection Agency (EPA) regulations. This plan follows the guidelines established in the following:

- Standard Operating Safety Guidelines (EPA, November 1984)
- Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities (National Institute of Occupational Safety and Health [NIOSH] 85-115)
- Title 29 of the Code of Federal Regulations (CFR), Part 1910.120, U.S. Department of Labor (DOL)/OSHA
- Title 29, CFR, Part 1910, Occupational Safety and Health Standards, Revised July 1, 1990

- Title 29, CFR, Part 1926, Safety and Health Regulations for Construction, Revised July 1, 1990
- U.S. Army Corp of Engineers, Safety and Health Requirements Manual, EM 385-1-1, April 1981, Revised October 1992
- NIOSH, Pocket Guide to Chemical Hazards, Publication No. 90-117, Revised 1990
- ACGIH, Threshold Limit Values and Biological Exposure Indices for 1993-1994.
- NIOSH/OSHA, Occupational Health Guidelines for Chemical Hazards, U.S. Department of Health and Human Services, NIOSH Publication No. 81-123, January 1981, Supplemented 1988.
- CHRIS Hazardous Chemical Data, U.S. Department of Transportation, United States Coast Guard, Command Instruction M.16465.12A, June 1985.

The contents of this plan are consistent with the following IT H&S policies and procedures:

- HS001 Safety Policy
- HS002 Safety Policy: International Operations
- HS010 Employee Safety and Health Works Rules
- HS011 Contractor Safety and Health Rules
- HS013 Health and Safety Procedure Variances
- HS018 Safety Councils
- HS019 Injury and Illness Prevention Program
- HS020 Accident Prevention Program: Reporting, Investigation, and Review
- HS021 Accident Prevention Program: Management Safety Audits and Inspections
- HS022 Accident Prevention Program: Review of New Proposals, Projects, Operations, and Construction

- HS040 Stop Work Authority
- HS041 Embryo-Fetus Protection Program
- HS050 Training Requirements
- HS051 Tailgate Safety Meetings
- HS052 Health and Safety Plans
- HS060 Hazard Communication Program
- HS080 Insurance Claims
- HS090 OSHA Regulatory Inspections
- HS091 Serious Injury and Fatality Reporting Requirements T
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- HS100 Medical Policies and Procedures
- HS101 Drug and Alcohol Testing A
- HS102 Access to Employee Exposure and Medical Records
- HS103 Maintenance of Employee Exposure and Medical Records R
- HS104 Employee Notification of Industria Hygiene Monitoring Results D
- HS105 Occupational Injuries/Illnesses Procedures
- HS106 First Aid Kits
- HS300 Confined Spaces, Industrial
- HS303 Hydroblasting
- HS304 Compressed Gas
- HS305 Pressurized Systems
- HS307 Excavation and Trenching

- HS310 Hazardous Waste Operations at Uncontrolled Waste Sites
- HS314 Hot Work in Hazardous Locations
- HS400 Working in Hot Environments
- HS401 Cold Stress
- HS402 Hearing Conservation Program
- HS512 Handling of Blood or Other Potentially Infectious Materials
- HS600 Personal Protective Equipment
- HS601 Respiratory Protective Program
- HS602 Eye Protection - Prescription Safety Glasses
- HS604 Use and Maintenance of Portable Electrical Equipment
- HS800 Motor Vehicle Operation: General Requirements
- HS810 Commercial Motor Vehicle Operation and Maintenance

2.0 Responsibilities

2.1 All Personnel

Each person is responsible for the H&S of themselves and their coworkers, for completing tasks in a safe manner, and reporting any unsafe acts or conditions to their Supervisor and/or the Site Supervisor (SS). All personnel are responsible for continuous adherence to these H&S procedures during the performance of their work. No person may work in a manner that conflicts with the letter or the intent of, or the safety and environmental precautions expressed in these procedures. After due warnings, IT will dismiss from the site any person who violates safety procedures. IT's employees and subcontractors are subject to progressive discipline and may be terminated for blatant or continued violations. All on-site personnel will be trained in accordance with 29 CFR 1926.65 and this document.

2.2 Safety and Health Manager

The safety and health manager (SHM) is responsible for the development, implementation, and oversight of the Safety and Health Program and the SSHP. The SHM may designate a fully trained and experienced individual, such as the SS, to implement and continually enforce safety policies and activities on site.

The SHM will have a minimum of four years of experience relevant to hazardous waste operations and occupational H&S. The SHM will have a college degree in H&S or a related field. Certification in Industrial Hygiene by the American Board of Industrial Hygiene (ABIH) is desired.

2.3 Project Manager

The PM is ultimately responsible for ensuring that all project activities are completed in accordance with requirements set forth in this plan. The PM must perform at least one on-site safety review during the project. The PM is responsible for ensuring all accidents and incidents on the project are reported and thoroughly investigated. The PM must approve in writing any addenda or modifications of the SSHP.

The PM is responsible for ensuring that the necessary personnel are available for this project and that the reporting, scheduling, and budgetary obligations for this project are met.

2.4 Site Safety and Health Officer

The site safety and health officer (SSHO) is responsible for providing technical assistance to the SS with respect to H&S matters. The SSHO will conduct daily inspections to determine if operations are being conducted in accordance with the SSHP, USACE contract requirements, EPA H&S guidelines, and OSHA requirements. The SSHO will report to the SHM and the SS. In the absence of a SSHO, the SS will assume the responsibilities of the SSHO.

2.5 Site Supervisor

The SS will be responsible for field implementation of the SSHP plan. This will include communicating site requirements to all on-site project personnel (both IT and subcontractor personnel) and consultation with the SSHO. The SS will be responsible for informing the SSHO and the PM of any changes in the work plan, so that those changes may be properly addressed. The SS, as the on-site representative of IT, is responsible for maintaining contact with the USACE representative, the SHM, and the PM. The SS is also responsible for coordinating and enforcing H&S activities for all individuals on site at all times. The SS will report to the PM and work directly with the USACE representative.

The SS will have a minimum of two years of field experience and supervisory experience. The SS will have completed an Eight-Hour Supervisor course as required by 29 CFR 1910.120, in addition to complying with the site entry requirements described in Section 6.5.

Other responsibilities include:

- Enforcing the requirements of the SSHP. This includes performing daily safety inspections of the work site.
- Stopping work, as required, to ensure personal safety and protection of property, or where life- or property-threatening noncompliance with safety requirements is found.
- Determining and posting routes to capable medical facilities and emergency telephone numbers (including poison control facilities) and arranging emergency transportation to medical facilities.
- Notifying local public emergency officers of the nature of the site operations,

and posting of their telephone numbers in an appropriate location.

- Observing on-site project personnel for signs of chemical or physical trauma.
- Ensuring that all site personnel have been given the proper medical clearance, ensuring that all site personnel have met appropriate training requirements and have the appropriate training documentation on site, and monitoring all team members to ensure compliance with the SSHP.

2.6 Subcontractors, Visitors, and Other On-Site Personnel

Subcontractors are responsible for the H&S of their employees and for complying with the standards established in this SSHP. Subcontractors are required to follow the guidelines established in IT's General Safety Rules for Contractors and this SSHP. Subcontractors will report to the SS.

If there is any dispute with regard to H&S, the on-site staff will attempt to resolve the issue. If the issue cannot be resolved, they will consult off-site technical staff and supervisors for assistance. The specific task or operation in question shall not be discontinued until the issue is resolved. All subcontractors, visitors, and other on-site personnel must check in with the SS prior to gaining access to the site, in order to verify that appropriate entry requirements are met. Each person is responsible for their own H&S, for completing tasks in a safe manner, and for reporting unsafe acts or conditions to his/her supervisor or the IT Representative. Refer to Appendix A.

3.0 Job Hazard Analysis

3.1 Scope of Work

IT will provide the necessary labor, material, equipment, and subcontractors necessary to install the remaining components required to remediate the Naples Truck Stop fuel spill. The scope consists of the construction of a concrete block building, the installation of a second vacuum extraction unit, the operation of a bioremediation treatment system, operation and maintenance, and related activities.

3.2 Job Hazard Assessment by Task

The hazard assessment identifies potential safety, health, and environmental hazards and provides for the protection of personnel, the community, and the environment. Because of the complexity and constant change of remediation projects, supervisors must continually inspect the work site to identify hazards which may harm site personnel, the community, or the environment. The PM, Project Engineer, SS, and SSHO must be aware of these changing conditions and discuss them with the SHM. The SHM will write addenda to change Job Safety Analyses and associated hazard controls as necessary. The site-specific Material Safety Data Sheets (MSDS) are included in Appendix B.

All IT personnel and subcontractors will be familiar with these associated hazards, with each task, and strictly adhere to the appropriate safety procedures. The potential hazards and the appropriate controls will be presented to project personnel during daily Tailgate Safety Meetings. The site-specific chemical hazards are outlined in Table 1. For task-specific personal protective equipment (PPE) refer to Table 2.

3.2.1 Task 1: Construction of Concrete Block Building

During this task, a building will be constructed for the vapor recovery system. This will involve using heavy equipment and various hand tools to construct the building.

Physical Hazards. Electrical shock can result from improper installation of electrical wiring. Use only qualified electricians for electrical equipment installation.

Heavy material handling is a major concern. Ensure that the appropriate material handling equipment is utilized. Follow proper lifting and moving techniques and do not lift over 60 pounds without assistance.

Slip, trips, and falls are associated with construction. Be sure of footing and ensure that there is always a clear path of travel.

Nip/pinch points and cuts are associated with handling material. Inspect material prior to moving to ensure that there are no sharp edges.

Working with Powered Hand Tools. Hand tools will be utilized to construct facilities. The new building will be constructed by making necessary connections and installing required controls.

Electric shock is associated with improper use of hand tools. Utilize a ground fault circuit interrupter (GFCI) for all electrical equipment on branch circuits not a part of permanent wiring.

Vehicular Traffic. Equipment will be utilized for construction of the building. The hazard associated with vehicular traffic is that personnel may be struck by vehicles while loading. Pedestrians must make sure to keep eye contact with vehicle operator before approaching. Hand signals must be utilized as necessary. The loading area must be barricaded. Unnecessary personnel must be kept away from the loading area. Be certain brakes are applied to parked vehicles and chock parked trailers.

3.2.2 Task 2: Enhanced Vapor Extraction Unit Installation

Physical Hazards. During this phase of the operation, employees will be exposed to slip and trip hazards. Heat stress is also a potential concern; however, during this phase of the operation, heat stress exposure will be minimal. Refer to Section 4.5.1 for a discussion of heat stress.

Noise may also present a hazard since equipment operation frequently results in noise levels exceeding 85 decibels (dB), requiring the use of hearing protection.

Chemical Hazards. The potential chemical hazards involved at the site are related to benzene contamination. The most likely hazard is exposure to benzene from inhalation of fumes at various points of the extraction system. Detailed chemical hazard information is listed in Table 1 and provided through the MSDSs.

3.2.3 Task 3: Bioremediation Treatment System

Installation of Treatment System. The treatment system is presently housed in a small wooden shed and is connected to the vapor extraction unit. When and if the system is moved to the new concrete block building, the physical hazards of this operation will be primarily associated with the operation of both heavy machinery and hand tools, trenching and open excavations, plumbing and electrical work, storage of building materials, flammable and combustible liquids, and sprains and strains from heavy lifting. 1

In addition to the safety hazards specific to installation operations, hazards associated with the operation of vehicles, particularly large vehicles, will be a concern. F Of particular concern will be the backing up of trucks and other support vehicles.

Excavation. The primary hazards of excavation activities for the purpose of installing buried pipeline and electrical lines include potential cave-ins due to heavy equipment operation or changing soil/weather conditions; slip, trip, and fall hazards related to equipment handling and/or uneven or unstable surfaces; and excessive noise from on-site equipment. A

Entry of personnel into site excavations presents additional potential hazards of confined-space entry. Potential hazards associated with confined-space entry include the following: the possible buildup of toxic, combustible, or oxygen-deficient/enriched atmospheres; uneven/slippery surfaces; the possibility of liquids or gases being admitted into the space during occupancy; or the physical isolation of the employee(s) when in need of rescue. D

Operation/Maintenance of Treatment System. The system will be in operation for a limited period of time. During the operation of the treatment system, the physical hazards may be limited to sprains and strains from heavy lifting; slip, trip, and fall hazards; fueling/storage of flammable/combustible liquids; splash/flying debris hazards; pinch

points/cut hazards; contact with potentially contaminated material; and potential electrocution hazards from power connections and electrical hand tools.

While in operation, the system may require general maintenance and repair. The physical hazards associated with these activities include those concerning general equipment operation; contact with potentially contaminated materials; slip, trip, and fall hazards; pinch point/cut hazards; fire hazards; strains and sprains from heavy lifting; and electrocution from power connections and electrical hand tools.

Utility Hazards. The presence of overhead utilities, such as power lines, requires careful positioning of the excavator in order to maintain at least 20 feet of distance between the lines and the closest part of the equipment. Underground utilities must be marked and located prior to and during excavation activities.

3.2.4 Task 4: Vadose Zone/Monitoring Point Installation

IT will be drilling and installing vadose zone monitoring points. Physical hazards specific to drilling are listed below:

- **Slips.** Slips are toothed wedges positioned between the drill pipe and the master bushing/rotary table, to suspend the drill string in the bore when it is not supported by the hoist. Most accidents associated with slip operations are related to manual materials handling. Strained backs and shoulders are common.
- **Tongs.** Tongs are large counterweighted wrenches used to break out the torqued couplings on drill pipe. Both sets of tongs have safety lines. When break out force is put on the tongs, the tongs or the safety lines could break and injure an employee standing close to them. Another likely accident can occur when the driller actuates the wrong tong level and an unsecured tong swings across the rig floor at uncontrolled velocity. A common accident attributable to tongs can occur when an employee has his hand or finger in the wrong place as he attempts to swing and latch the tong onto the drill pipe, resulting in crushing injuries or amputation of the fingers.
- **Elevators.** Elevators are a set of clamps affixed to the bails on the swivel below the traveling block. They are used to clamp each side of a drill pipe and hold the pipe as it is pulled from the bore. Accidents and injuries can occur during the latching and unlatching tasks. Fingers and hands can get caught and crushed in the elevator latch mechanism. If the pipe is overhead when the

latching mechanism fails, then the pipe may fall on employees working on the drill floor.

- **Cat Lines.** Cat lines are used on drilling rigs to hoist material and for driving sampling equipment. Accidents that occur during cat line operations may injure the employee doing the rigging, as well as injure the operator. Minimal hoisting control causes sudden and erratic load movements which may result in hand and foot injuries.
- **Working Surfaces.** The rig floor is the working surface for most tasks performed in drilling operations. The surface is frequently wet from circulating fluid and/or the water used to wash it down. Slippery work surfaces can increase the likelihood of back injuries, overexertion injuries, and slips and falls.
- **Materials Handling.** The most common type of accident that occurs in materials handling is the "caught between" situation when a load is being handled and a finger or toe gets caught between two objects. Rolling stock can shift and/or fall from a pipe rack or truck bed.

In addition to the specific hazards listed above, rigs produce hazardous noise levels and accidents can occur as a result of improperly placing the rig on uneven or unstable surfaces or failing to adequately secure the rig before starting operations.

Chemical Hazards. Chemical hazards associated with the drilling and well installation operation include the fuels and lubricants used with the drill rig and the volatile organic compound (VOC)-contaminated tailings. Table 1 discusses the possible chemical hazards and their exposure standards.

3.2.5 Tasks 5 and 6: Groundwater/Soil Sampling

IT will collect and analyze groundwater/soil samples from the wells. The samples will be analyzed off site for various organic, inorganic, and general chemical parameters.

Physical Hazards. The physical hazards involved in this task are related to the handling of contaminated groundwater and soil.

Slip, trip, and fall hazards will be of concern during this task. Should the walking or working surfaces become wet, extra caution must be taken to avoid slipping.

Noise is not expected to be a hazard during this operation, but if noise levels exceed 85 dB, the use of hearing protection will be required.

Splash hazards will be present during the sampling of wells. Employees will be made aware of this hazard and handle all groundwater with appropriate care. Splash shields will be used by all employees engaged in this activity.

Employees will follow proper lifting techniques when sampling wells. No one will be permitted to lift over 60 pounds without getting assistance.

Chemical Hazards. Inhalation of VOCs from groundwater wells and contaminated soil may pose a potential hazard for exposure during this task. Skin absorption of VOCs from contact with contaminated water and soil also pose a risk. Table 1 discusses chemical hazards and their exposure standards.

3.3 Heat Stress Signs and Symptoms

Wearing PPE places a hazardous waste site worker at considerable risk of heat stress. Heat stress effects range from transient heat fatigue to serious illness and death. Heat stress is caused by several interacting factors including environmental conditions, clothing, work load, and the individual characteristics of the worker. Because heat stress is the most common and potentially serious illness at hazardous waste sites, preventive measures and alertness to the signs and symptoms are vital.

Heat stress monitoring should begin when personnel are wearing PPE, including Tyvek coveralls, and the ambient temperature exceeds 70 degrees Fahrenheit (°F). If impermeable garments are not worn, heat stress monitoring should begin at 85°F. When ambient temperatures exceed 90°F and impermeable garments are worn, physiological monitoring will be implemented.

Heat Rash. Heat rash is caused by continual exposure to heat and humid air, and is aggravated by chaffing clothes. Heat rash decreases a person's ability to tolerate heat as well as becoming an irritating nuisance.

Heat Cramps. Heat cramps are caused by heavy sweating and inadequate electrolyte replacement. Signs and symptoms include muscle spasms and pain in the hands, feet, and abdomen.

Heat Exhaustion. Heat exhaustion occurs from increased stress on various body organs including inadequate blood circulation due to cardiovascular insufficiency or dehydration. Signs and symptoms include:

- Pale, cool, moist skin
- Heavy sweating
- Dizziness
- Nausea
- Fainting.

Heat Stroke. Heat stroke is the most serious form of heat stress. Temperature regulation fails and the body temperature rises to critical levels. Immediate action must be taken to cool the body before serious injury or death occur. Competent medical help must be obtained immediately. This is a true medical emergency. Signs and symptoms are:

- Red, hot, usually dry skin
- Lack of or reduced perspiration
- Nausea
- Dizziness and confusion
- Strong, rapid pulse (initially)
- Coma.

3.4 Signs and Symptoms of Cold Stress

Most cold-related worker fatalities have resulted from failure to escape low environmental air temperatures, or from immersion in low temperature water. The single most important aspect of life-threatening hypothermia is a drop in the deep-core body temperature.

Employees should be protected from exposure to cold so that their deep-core body temperature does not fall below 36 degrees Celsius (°C) (equivalent to 98.6°F). A lower body

temperature will very likely result in reduced mental alertness, reduction in rational decision-making, or loss of consciousness with the threat of fatal consequences.

Frostbite. Frostbite occurs when the extremities do not get sufficient heat from the central body stores. The fluids around the cells of the body tissues freeze from exposure to low temperatures. This condition can result in damage to, and loss of, tissue. The most vulnerable areas are the nose, cheeks, ears, fingers, and toes.

Damage from frostbite can occur in either the outer layers of skin, or in the tissue beneath these layers, and can be serious resulting in scarring, tissue death, permanent loss of movement, or amputation.

There are three degrees of frostbite:

- First degree: freezing without blistering or peeling
- Second degree: freezing with blistering or peeling
- Third degree: freezing with skin tissue death and possible deeper tissue damage.

Symptoms of frostbite include:

- Skin color changes to white or grayish-yellow, to reddish-violet, and finally black as the tissue dies
- Pain may be felt at first, but subsides
- Coldness or numbness of the affected part.

Hypothermia. This is the most severe form of cold stress and results from a drop in the body's core temperature. The symptoms of hypothermia are:

- First, uncontrollable shivering and the sensation of cold
- Heartbeat slows and may become irregular
- Pulse weakens and the blood pressure changes
- As the body's core temperature drops, other signs may include cool skin, slow irregular breathing, and apparent exhaustion

- When core temperatures are in the mid-range, the victim may become listless, confused, exhibit severe shivering, or develop severe pain in the extremities
- Final signs are a significant drop in blood pressure, fatigue, and shallow respiration.

3.5 Hazardous and Toxic Materials

This section discusses the hazards associated with materials that are used on the site or are likely to be found on the site. The SHM will update this section as information developed during this project warrants. The significant chemical hazards that maybe associated with this site are ethyl benzene, xylene, benzene, and toluene. Table 1 addresses this material.

3.6 Exposure Standards

Threshold Limit Values (TLV) refer to airborne concentrations of substances which represent conditions that nearly all employees may be repeatedly exposed to day after day without adverse effect. These TLVs are prescribed by the American Conference of Governmental Industrial Hygienists (ACGIH) and are based upon the best available information obtained through industrial experience and animal or human studies. Because of the wide variation in individual susceptibility, a small percentage of workers may experience discomfort from some substances at concentrations below the recommended values. It has been policy to use these guidelines for good hygienic practices; however, whenever applicable, stricter guidelines may be utilized.

Currently, exposure guidelines to pesticides and other chemical substances are regulated by OSHA. These exposures are based upon the time-weighted average (TWA) concentration for a normal 8-hour workday and a 40-hour work week. Several chemical substances have short-term exposure limits (STEL) or ceiling values which allow a maximum concentration to which workers can be exposed continuously for a short period of time without suffering from:

- Irritation
- Chronic or irreversible tissue damage
- Narcosis of a sufficient degree to result in accidental injury, impaired self-rescue abilities or substantially reduced work efficiency.

The STEL is defined by the ACGIH as a 15-minute TWA exposure which should not be exceeded at any time during a workday even if the 8-hour TWA is within the TLV-TWA. Exposure above the TLV-TWA up to the STEL should not be longer than 15 minutes and should not occur more than four times per day. There should be at least 60 minutes between successive exposures in this range. An averaging period other than 15 minutes may be recommended when this is warranted by observed biological effects. OSHA requires that a 15-minute "Ceiling" concentration never be exceeded for that chemical constituent. This notation appears as the letter "C" after the chemical name.

Under certain chemical substance listings, a "skin" notation may appear. This refers to the potential contribution to the overall exposure by the cutaneous route, including mucous membranes and eye, either airborne or by direct contact. Little quantitative data is available describing absorption as a function of the concentration to which the skin is exposed. Biological monitoring may be considered to determine the relative contribution of dermal exposure to the total dose.

The ACGIH and OSHA have recognized through epidemiological studies, toxicology studies, and, to a lesser extent, case histories that certain chemical substances may have the potential to be carcinogenic in humans. Because of the long latency period for many carcinogens, it is often impossible to base timely risk management decisions on the results of such information. Two categories of carcinogens are designated based upon the most current literature and information. These include confirmed human carcinogens and suspected human carcinogens. These chemical categories are based on either:

- Limited epidemiologic evidence
- Demonstration of carcinogens in one or more animal species by appropriate methods.

The worker potentially exposed to a known human carcinogen must be properly equipped to ensure virtually no contact with the chemical constituents. In the case of a suspected human carcinogen, worker exposure by all routes must be carefully controlled by the use of personal and respiratory protection and through administrative or engineering controls.

Table 1 represents the strictest set of guidelines currently established by either the ACGIH or OSHA.

3.7 Biological Hazards

Ticks. Ticks are vectors of many different diseases including: rocky mountain spotted fever, Q fever, tularemia, Colorado tick fever, and lyme disease. They attach to their hosts' skin and intravenously feed on its blood creating an opportunity for disease transmission. Covering exposed areas of the body and the use of tick repellent are two ways to prevent tick bites. Periodically during the work day, employees will inspect themselves for the presence of ticks, paying special attention to check areas where hair is present.

Poisonous Plants. Poison ivy, poison oak, and poison sumac are identified by three or five leaves radiating from a stem. Poison ivy is in the form of a vine, while oak and sumac are bush-like. All produce a delayed allergic hypersensitivity. The plant tissues have an oleoresin, which is active in live, dead, and dried parts. The oleoresin may be carried through smoke, dust, contaminated articles, and the hair of animals. Symptoms usually occur 24 to 48 hours after exposure, resulting in burning or stinging, and weeping and/or crusted blisters. Should exposure to any of these plants occur, wash the affected area with a mild soap and water, but do not scrub the area. The best antidote for poisonous plants is recognition and avoidance.

Snakes. Poisonous snakes indigenous to the Vernal, Utah area include Cottonmouth, Copperheads, and Rattlesnakes. The degree of toxicity resulting from snakebites depends on the potency of the venom, the amount of venom injected, and the size of the person bitten. Poisoning may occur from injection or absorption of venom through cuts or scratches.

The most effective way to prevent snakebites is to avoid snakes in the first place. Personnel should avoid walking at night or in high grass and underbrush. Visual inspection of work areas should be performed prior to activities taking place. The use of leather boots and long pants will be required, since more than half of all bites are on the lower part of the leg. No attempts at killing snakes should be made; many people are bitten in such an attempt.

Flying Insects. Flying insects such as mosquitos, wasps, hornets, and bees may be encountered while site activities occur. Table 3 discusses problems associated with them.

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4.0 Standard Operating Safety Procedures, Engineering Controls, and Work Practices

The following work practices will be observed during all site activities.

4.1 General Practices

- At least one copy of this plan shall be available at the project site, in a location readily available to all personnel.
- Contaminated protective equipment, such as respirators, hoses, boots, etc., shall not be removed from the regulated area until it has been cleaned or properly packaged and labeled.
- Legible and understandable precautionary labels that comply with the hazard communication standard shall be affixed prominently to all containers of contaminated scrap, waste, debris, and clothing.
- Removal of contaminated soil from protective clothing or equipment by blowing, shaking, or any other means that disperse contaminants into the air is prohibited.
- No food or beverages shall be present or consumed in the regulated area.
- No tobacco products shall be present or used in the regulated area.
- Cosmetics shall not be applied within the regulated area.
- Contaminated materials shall be stored in tightly closed containers, in well-ventilated areas.
- Containers shall be moved only with the proper equipment, and shall be secured to prevent dropping or loss of control during transport.
- Emergency equipment shall be located outside storage areas in readily accessible locations that will remain minimally contaminated in an emergency.
- All areas that have been determined as uncontaminated inside the regulated area will be clearly marked as such. No personnel, equipment, etc., shall be in these areas until they have been decontaminated.
- Ensure that no one is required to lift more than 60 pounds.

- Any detected effects of toxic exposure shall be reported to the SS immediately.
- The wearing of contact lenses is not allowed in contamination zones.
- An emergency eyewash unit shall be located immediately adjacent to employees who handle hazardous or corrosive materials, including decontamination fluids. All operations involving the potential for eye injury, splash, etc., must have approved eyewash units locally available as per 29 CFR 1910.151 (c).
- Enter work-site upwind (as possible) from visible contamination; this area should be marked as an entrance by flagging.
- If any on-site activities, including decontamination, continue later than dusk, adequate lighting must be provided. Work areas must have adequate lighting for employees to see to work and identify hazards (5-foot candles minimum). Personnel should carry flashlights in all normally dark areas for use in the event of a power failure. Applicable OSHA standards for lighting - 29 CFR 1910.120 (m) shall apply. No work is to be conducted during storms.
- All electrical power must have a GFCI as part of the circuit. All equipment must be suitable and approved for the class of hazard present. Applicable OSHA standards for electrical - 29 CFR 1926 Subpart "K" shall apply.
- The movement and opening of drums will be done in accordance with 29 CFR 1910.120 (j).
- Whenever possible, avoid contact with contaminated (or potentially contaminated) surfaces. Walk around (not through) puddles and discolored surfaces. Do not kneel on the ground or set equipment on the ground. Stay away from any waste drums if possible. Protect equipment from contamination by bagging it.
- Contamination (exclusion and decontamination) zones as established on the site shall be observed. Entry into the contamination zones shall be by prior notification and authorization of the SS. All required protective clothing shall be worn prior to entering contamination zones.
- Contaminated equipment and contaminated PPE, such as respirators, gloves, boots, etc. (if not discarded), shall not be removed from the contamination zones until they have been properly cleaned. Proper decontamination will be determined by the SS or a designate.
- Legible and understandable precautionary labels shall be affixed prominently to containers of contaminated scrap, waste, debris, and clothing.

- Contaminated materials shall be stored in tightly closed containers in well-ventilated areas.
- No food or beverages shall be present or used, and cosmetics shall not be applied in the contamination zones. They are only allowed in designated areas of the support zone.
- Beards, facial hair, or other facial obstructions that interfere with respirator fit will preclude admission to the exclusion zone (EZ) when respirators are required.
- Emergency equipment shall be located outside storage areas, in readily accessible locations, which will remain minimally contaminated.
- Employees shall inform their partners or fellow team members of nonvisible effects of overexposure to toxic materials. The symptoms of such overexposure may include:
 - Headaches
 - Dizziness
 - Nausea
 - Blurred vision
 - Cramps
 - Irritation of eyes, skin, or respiratory tract.
- Visitors to the site shall abide by the following:
 - All visitors shall be instructed to stay outside the contaminated zone (exclusion and decontamination zones) and remain within the clean zone during the extent of their stay. Visitors shall be cautioned to avoid skin contact with contaminated or suspected contaminated surfaces.
 - Visitors requesting to observe work conducted in the EZ must wear all appropriate PPE, prior to entry into that zone. If respiratory protective devices are necessary, visitors who wish to enter the contaminated zone must produce evidence that they have had a complete physical examination, training, and have been fit tested for a respirator within the past 12 months.
 - Visitor inspection of the contaminated area shall be at the discretion of the SS.

Buddy System. All on-site personnel shall use the buddy system. Personnel shall operate in teams, with each member of the team responsible for observing the other team members for:

- Signs and symptoms of chemical exposure
- Exposure to possible safety hazards
- Unsafe acts, or noncompliance with safety procedures.

No personnel will work on site if they are not within the line of sight of another team member.

4.2 Drilling Equipment Operations

Prior to the start of site work, all drilling equipment will be inspected in the presence of the SS. The inspection will be documented in the field records. If field operations last longer than one week, the drilling equipment inspection must be repeated on a weekly basis.

The location of all underground utilities must be ascertained and confirmed prior to the start of drilling operations. In addition to obtaining the utility locations from the client, the IT Geophysics Group or a qualified subcontractor will make a utility survey of each drilling point. The utility survey shall include both magnetometer and ground penetrating radar survey. Documentation that nearby utilities have been marked on the ground and that the drill site has been cleared shall be in the possession of the SS (or his designee) prior to commencement of the intrusive investigation at that point of the site.

4.2.1 General Drilling Practices

Drill Crews. All drillers performing work must possess required state or local licenses to perform such work. All members of the drill crew must receive site-specific training prior to beginning work.

The driller must be responsible for the safe operation of the drill rig as well as the crew's adherence to the requirements of this SSHP. The driller must ensure that all safety equipment is in proper condition and is properly used. The members of the crew must follow all instructions of the driller, wear all PPE, and be aware of all hazards and control procedures.

The drill crews must participate in the daily Tailgate Safety Meetings and be aware of all emergency procedures.

Rig Inspection. Each day, prior to the start of work, the drill rig and associated equipment must be inspected by the driller and/or drill crew. The following items must be inspected:

- Vehicle condition
- Proper storage of equipment
- Condition of all wire rope
- Fire extinguisher
- First aid kit.

Rig Set Up. The drill rig must be properly blocked and levelled prior to raising the derrick. The wheels which remain on the ground must be chocked. The rig will be moved only after the derrick has been lowered. The levelling jacks must not be raised until the derrick is lowered.

Site drilling will comply with the following rules:

1. Before drilling, the existence and location of underground pipe, electrical equipment, and gas lines will be determined. This will be done, if possible, by contacting the appropriate client representative to mark the location of the lines. If the client's knowledge of the area is incomplete, an appropriate device, such as the cable avoiding tool, will be used to locate service lines.
2. No ignition sources are permitted if the ambient airborne concentration of flammable vapors exceeds 10 percent of the lower explosive limit (LEL) when drilling. A combustible gas indicator will be used to make this determination.
3. Operations must be suspended and corrective action taken if the airborne flammable concentration reaches 10 percent of LEL in the immediate area (a 1-foot radius) of the point of drilling.
4. Combustible gas reading of the general work area will be made regularly.
5. If drilling is conducted in the vicinity of overhead power lines, a distance of 15 feet must be maintained between the lines and any point on the drill rig. If the lines have appreciable sag, or if windy conditions exist, this distance shall be 20 feet.

6. If lubrication fittings are not accessible with guards in place, machinery must be stopped before oiling and greasing. Fuel, hydraulic fluid, or oil shall not be placed in the drill rig unless the engine has been turned off.
7. Rigging material equipment for material handling must be checked prior to use on each shift and as often as necessary to ensure it is safe. Defective rigging must be removed from service immediately.
8. Drillers shall not add or remove pipe or augers from the drill stem without the assistance of the driller's helper.
9. If drill cuttings are to be drummed and moved to a central storage location, lifting and transporting of these drums should be completed using the appropriate equipment and following safe loading and unloading procedures.






4.2.2 Hoisting Operations

- Drillers must never engage the rotary clutch without watching the rotary table and ensuring it is clear of personnel and equipment.
- Unless the drawworks is equipped with an automatic feed control, the brake must not be left unattended without first being tied down.
- Casing or augers must not be picked up suddenly.
- Drill pipe or augers must not be hoisted until the driller is sure that the pipe or augers are latched and the drilling assistant has signalled that he/she may safely hoist the load.
- During instances of unusual loading of the derrick or mast, such as when making an unusually hard pull, only the driller will be on the rig floor and no one will be on the rig or derrick.
- The brakes on the drawworks of every drilling rig must be tested by each driller at the beginning of each shift to determine whether they are in good order. The brakes must be thoroughly inspected by a competent individual each week.
- A hoisting line with a load imposed will not be permitted to be in direct contact with any derrick member or stationary equipment unless it has been specifically designed for line contact.
- Hoisting control stations must be kept clean and controls labelled as to their functions.

4.2.3 Riding Hoisting Equipment

Under no circumstances will personnel be permitted to ride the travelling block or elevators, nor will the cat line be used as a personnel carrier.

4.2.4 Cat Line Operations

- Only experienced workers will be allowed to operate the cathead controls. The kill switch must be clearly labelled and operational prior to operation of the cat line.
- The cathead area must be kept free of obstructions and entanglements.
- The operator will not use more wraps than necessary to pick up the load. More than one layer of wrapping is not permitted.
- Personnel must not stand near, step over, or go under a cable or cat line  which is under tension.
- Employees rigging loads on cat lines must: 
 - Keep out from under the load
 - Keep fingers and feet where they will  not be crushed
 - Be sure to signal clearly  when the load is being picked
 - Use standard visual signals only and not depend on shouting to coworkers
 - Make  sure the load is properly rigged since a sudden jerk in the cat line will shift or drop the load.

4.2.5 Pipe Handling

- Pipe must be loaded and unloaded, layer by layer, with the bottom layer pinned or blocked securely on all four corners. Each successive layer must be effectively blocked or chocked.
- Workers will not be permitted on top of the load during loading, unloading, or transferring of pipe or rolling stock.

- Employees must be instructed never to try to stop rolling pipe or casing; they must be instructed to stand clear of rolling pipe.
- When pipe or augers are being hoisted, personnel will not stand where the bottom end of the pipe or auger could whip and strike them.

4.2.6 Equipment Decontamination

- All sampling equipment coming into direct contact with soil samples shall be decontaminated between samples.
- All other drilling equipment shall be decontaminated between drilling locations.
- All drilling equipment shall be decontaminated prior to the initiation of drilling activities and after completion of drilling operations before leaving the site.

4.3 Fall Protection

The walking and working surfaces may become wet and slippery during these tasks. Use extra caution when working on these surfaces. In addition, visible barriers will be erected around any open excavations or trenches to prevent personnel from falling into these areas. Any person working more than 4 feet off the ground must use the appropriate fall protection.

4.4 Project Specific Practices

To prevent personnel exposure to heat stress during all tasks, the practices outlined in Section 4.5.1 will be followed.

The work area must be marked in such a way as to prevent traffic from passing within 10 feet of the work area. Cones, caution tape, barricades, or other means must be used to define the work area.

All on-site personnel must wear steel-toed safety shoes, hard hats, and safety glasses. Long pants or trousers and shirts covering the upper body and upper arms must also be worn.

4.5 Heat Stress Prevention

4.5.1 Heat Stress

One or more of the following control measures can be used to help control heat stress and are mandatory if any site worker has a heart rate (measure immediately prior to rest period) in excess of 110 beats per minute:

- Site workers will be encouraged to drink plenty of water throughout the day. They will be advised to slightly increase their salt intake by lightly salting their food.
- On-site drinking water will be kept cool (50 to 60°F) to encourage personnel to drink frequently.
- A work regimen that will provide adequate rest periods for cooling down will be established, as required.
- All personnel will be advised of the dangers and symptoms of heat stroke, heat exhaustion, and heat cramps.
- Cooling devices such as vortex tubes or cooling vests should be used when personnel must wear impermeable clothing in conditions of extreme heat.
- Employees should be instructed to monitor themselves and coworkers for signs of heat stress and to take additional breaks as necessary.
- A shaded rest area must be provided. All breaks should take place in the shaded rest area.
- Employees shall not be assigned to other tasks during breaks.
- Employees shall remove impermeable garments during rest periods. This includes white Tyvek-type garments.
- All employees shall be informed of the importance of adequate rest, acclimation, and proper diet in the prevention of heat stress disorders.

The signs of heat stress disorders are given below.

Heat Cramps. Heat cramps are caused by heavy sweating and inadequate electrolyte replacement. Signs and symptoms include muscle spasms and pain in the hands, feet, and abdomen.

Heat Exhaustion. Heat exhaustion occurs from increased stress on various body organs. Signs and symptoms include:

- Pale, cool, moist skin
- Heavy sweating
- Dizziness, nausea
- Fainting.

Heat Stroke. Heat stroke is the most serious form of heat stress and should always be treated as a medical emergency. The body's temperature regulation system fails, and the body temperature rapidly rises to critical levels. Immediate action must be taken to cool the body before serious injury or death occurs. Signs and symptoms of heat stroke include:

- Red, hot, usually dry skin
- Lack of, or reduced perspiration
- Nausea
- Dizziness and confusion
- Strong, rapid pulse and confusion
- Coma.

4.6 Hearing Conservation

All on-site IT and subcontractor personnel shall wear hearing protection, with a Noise Reduction Rating (NRR) of at least 20, when noise levels exceed 85 dB. All site personnel who may be exposed to noise shall also receive baseline and annual audiograms and training as to the causes and prevention of hearing loss. Noise monitoring is discussed in Chapter 8.0.

Whenever possible, equipment that does not generate excessive noise levels will be selected for this project. If the use of noisy equipment is unavoidable, wherever possible, barriers or increased distance will be used to minimize worker exposure to noise.

4.7 Excavation Safety

Postexcavation sampling is often a project requirement. When it is necessary to do excavation, IT Procedure HS307 for excavation and trenching must be followed. Any

excavation greater than 4 feet deep into which persons will enter to collect samples must be tested before entry. An excavation greater than 5 feet deep must be shored, sloped, or otherwise made safe for entry. The shoring or sloping system must be designed by a registered Professional Engineer (P.E.) licensed in the state in which the excavation will take place, as required. The design must be present at the site, and the system must be installed as designed.

All excavation shall be performed from a stable ground position. Daily inspections of the excavation shall be made by a competent person, one who has received training in excavation safety. The inspector shall determine the likelihood of a cave-in, and remedial action (RA) such as sloping or shoring shall be taken if the walls appear to be unstable.

All spoil shall be located at least 2 feet from the edge of the excavation to prevent it from falling back into the excavation. The excavation shall be guarded on all sides by barricades or caution tape at least 2 feet from the edge.

All project personnel shall participate in the daily tailgate safety meetings and be instructed on the following requirements:

- Before excavating, the existence and location of underground pipe, electrical equipment, and gas lines will be determined. This will be done, if possible, by contacting the appropriate utility company and/or client representative to mark the location of the lines. If the client's knowledge of the area is incomplete, an appropriate device, such as a cable avoiding tool, will be used to locate the service line.
- No ignition sources are permitted if the ambient airborne concentration of flammable vapors exceeds 10 percent of the LEL during the excavation. A combustible gas indicator will be used to make this determination.
- Operations must be suspended and the area vented if the airborne flammable concentration reaches 10 percent of the LEL in the area of an ignition source (i.e., sparks from bucket of excavator).
- Combustible gas reading of the general work area will be made regularly.
- If excavating equipment is located in the vicinity of overhead power lines, a distance of 10 feet must be maintained between the lines and any point on the

equipment. If the lines have appreciable sag, or if windy conditions exist, this distance shall be 20 feet.

4.8 Sanitation

A break area will be designated and provided in an area in the support zone (outside of contamination zones). Outdoor and indoor areas, such as trailers, may be designated. The designated areas will be clean and will facilitate the number of workers using it. Eating, drinking, and tobacco may be permitted in break areas.

IT will provide an adequate supply of drinking water. These drinks will be dispensed in an approved potable water system and in a manner which prevents contamination between the consumer and dispenser. All outlets dispensing nonpotable water will be posted "Caution - Water Unfit for Drinking, Washing, or Cooking." All containers used for storing and dispensing drinking water must be clearly marked and not used for any other purposes. A waste receptacle will be provided for used paper cups. Systems furnishing nonpotable water and systems furnishing potable water will be constructed and remain completely independent of each other.

IT will provide a chemical toilet for the personnel on site (USACE "Safety and Health Requirements Manual," Section 0.3B). Arrangements will be made for the routine servicing and cleaning of this unit. Water and cleaning compounds will be made available for decontamination, washing face and hands, and sanitation purposes.

4.8.1 Potable Water

The following rules apply for all project field operations:

- An adequate supply of potable water will be provided at each work site.
- Portable containers used to dispense drinking water shall be capable of being tightly closed, and shall be equipped with a tap dispenser. Water shall not be drunk directly from the container.
- Containers used for drinking water shall be clearly marked and not used for any other purpose.
- Disposable cups will be supplied; both a sanitary container for unused cups and a receptacle for disposing of used cups shall be provided.

4.8.2 Nonpotable Water

Outlets for nonpotable water shall be identified to clearly indicate that the water is unsafe and is not to be used for drinking, washing, or cooking purposes. There shall be no cross connection (open or potential) between potable and nonpotable water systems. Nonpotable and potable water systems shall be separated so as to minimize confusion and possible cross contamination.

4.8.3 Toilet Facilities

If permanent toilet facilities are not available (at sites more than 500 feet from a building with an accessible toilet), then a portable chemical toilet(s) will be provided.

4.8.4 Trash Collection

Trash collected from the contamination reduction zone (CRZ) will be separated as routine hazardous waste. Trash collected in the support and break areas will be disposed of as nonhazardous waste. Labeled trash receptacles will be set up in the CRZ and in the support zone.

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5.0 Personal Protective Equipment

Respiratory protective equipment shall be NIOSH-approved and respirator use shall conform to American National Standards Institute (ANSI) Z88.2 and OSHA 29 CFR 1910.134 requirements. Each employer shall maintain a written respiratory protection program detailing selection, use, inspection, cleaning, maintenance, storage, and fit testing or respiratory protective equipment.

All personnel (including visitors) performing on-site activities, and using a negative pressure respirator must have successfully passed a qualitative respirator fit test in accordance with OSHA 29 CFR 1910.134 within the last 12 months. Documentation of fit testing is the responsibility of each employer. Fit testing and any training related to respiratory protection for IT personnel will be documented on the IT Respiratory Training Completion Form.

The PPE outlined below has been selected according to the site characterization and analysis, job tasks, site hazards, intended use, and duration of potential employee exposures. Maintenance and storage of PPE, decontamination, donning and doffing procedures, inspection and monitoring of effectiveness, and limitation are outlined in this section. Refer to Table 4 for PPE Selection Matrix.

5.1 Respiratory Protection Program

The site respiratory protection program will consist of the following:

- All site personnel will have an assigned respirator.
- All site personnel must be fit tested and qualified in the use of an air-purifying respirator (APR) within the past 12 months. Fit test and respirator qualification cards must be provided to the SS prior to commencing site work.
- All site personnel must, within the past year, have been medically certified as being capable of wearing a respirator. Documentation of the medical certification must be provided to the SS prior to commencement of site work.
- Only properly cleaned, maintained, NIOSH-approved respirators are to be used on this site.

- If respirators are used, the respirator cartridge is to be disposed of at the end of each work shift, or when load-up or breakthrough occurs.
- Contact lenses are not to be worn when a respirator is worn.
- All site personnel will be clean shaven. Mustaches and side burns are permitted, but they must not touch the sealing surface of the respirator.
- Respirators will be inspected, and a positive, negative pressure test performed prior to each use.
- After each use, the respirator will be wiped with a disinfectant, cleansing wipe. When used, the respirator will be thoroughly cleaned at the end of the work shift. The respirator will be stored in a clean plastic bag.

5.2 Levels of Protection

The following is a brief description of the PPE which may be required during various phases of the project. At a minimum, four sets of appropriate PPE will be maintained at the site for visitor usage.

5.2.1 Level C Protection

Level C protection is not anticipated during this project.

If Level C protection is required, it shall be used when:

- The types of air contaminants have been identified, concentrations have been measured, and an APR is available that can remove contaminants
- The substance has adequate warning properties and all criteria for the use of an APR has been met.

Level C protective equipment at a minimum shall consist of:

- Chemical resistant coveralls (Saranex™ or equivalent)
- Chemical resistant boot covers (rubber or equivalent) worn over steel-toed work boots or chemical resistant steel-toed work boots (rubber or equivalent)
- Chemical resistant inner gloves (disposable)

- Chemical resistant outer gloves (nitrile or equivalent)
- Full-face APR with organic vapor/acid gas high-efficiency particulate air (HEPA) combination cartridges
- Hard hat
- Ankles/wrists taped with duct tape.

5.2.2 Level D Protection

Level D protection shall be used when:

- The atmosphere contains no known hazard
- Work functions preclude splashes, immersions, or the potential for unexpected inhalation of, or contact with, hazardous concentrations or harmful chemicals
- Atmospheric concentrations of contaminants are less than the TLV.

Level D protective equipment at a minimum shall consist of:

- Standard work uniforms or coveralls
- Steel-toes work boots
- Gloves as needed
- Safety glasses as needed
- Splash shield as needed
- Hard hat.

5.3 Using Personal Protective Equipment

Depending upon the level of protection selected for this project, specific donning and doffing procedures may or may not be required. The following procedures are mandatory if Level C or higher PPE is selected.

All persons entering the EZ shall put on the required PPE in accordance with the requirements of this plan. When leaving the EZ, PPE will be removed in accordance with the procedures listed, in order to minimize the spread of contamination.

5.3.1 Donning Procedures

These procedures are mandatory, only if Level C or higher PPE is required for the project:

- Remove bulky outerwear. Remove street clothes and store in clean location.
- Put on disposable or IT-issue (and laundered) work clothes or coveralls.
- Put on the required chemical protective coveralls or rain gear.
- Put on chemical protective boots or boot covers.
- Tape the legs of the coveralls to the boots with duct tape.
- Put on chemical protective gloves as required by the SSHP.
- Tape the wrists of the protective coveralls to the gloves.
- Don respirator if required, and perform appropriate fit check.
- Put hood or head covering over head and respirator straps. Tape the hood to the face of the respirator.
- Don remaining PPE, such as safety glasses or goggles and hard hat.

If these procedures are instituted, one person shall remain outside the work area to ensure that each person entering has the proper protective equipment. No persons shall be allowed to enter an EZ if they are not wearing the required PPE.

5.3.2 Doffing Procedures

The following procedures are only mandatory if Level C or higher PPE is required for this project. Whenever a person leaves a Level C or higher work site, the following decontamination sequence will be followed:

- Upon entering the CRZ, rinse contaminated materials from the boots or remove contaminated boot covers.
- Clean reusable protective equipment.
- Remove protective garments, equipment, and respirator. All disposable clothing should be placed in plastic bags, which are labeled with contaminated waste labels.

- Wash face and neck.
- Proceed to clean area and dress in clean clothing.
- Clean and disinfect respirator for next use.
- Proceed to the sign-out point.

All disposable equipment, garments, and PPE shall be bagged in two 6 mil plastic bags, properly labeled for disposal.

5.4 Selection Matrix

The level of personal protection selected will be based upon real-time air monitoring of the work environment and an assessment by the SS of the potential for skin contact with contaminated materials. The PPE Selection Matrix is given in Table 4.

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6.0 Site Control Measures

6.1 Authorization to Enter

Only personnel who have completed 40 hours of hazardous waste operations as defined under OSHA 29 CFR 1910.120, have completed their 40-hour training or refresher training within the past 12 months, and have been certified as fit for hazardous waste operations by a physician within the past 12 months shall be allowed within a site area designated as an EZ or CRZ. Personnel without such training may enter the designated support zone. The SS will maintain a list of authorized persons. That list will be provided to each IT site representative. Only personnel on the authorized persons list will be allowed within the EZ or CRZ.

6.2 Hazard Briefing

No person will be allowed on any IT field sites during site operations without first being given a site hazard briefing. In general, the briefing will consist of a review of the Tailgate Safety Meeting. All persons on the site, including visitors, must sign the site-specific Tailgate Safety Meeting Form.

6.3 Documentation of Certification

A training and medical file will be established for the project and kept on site during all site operations. The 40-hour training, update, and specialty training (first-aid/cardiopulmonary resuscitation [CPR]) certificates, as well as the current annual medical clearance for all project field personnel, will be maintained within that file. All IT and subcontractor personnel must provide their training and medical documentation to the SS prior to the start of field work.

6.4 Entry Log

The IT representative at the drilling site shall record on their Field Activity Daily Log (FADL) all visitors to the site. A log-in/log-out sheet shall be maintained at each site. Personnel will sign in and out on the sheet as they enter and leave the CRZ. At the end of each shift, the log will be collected by the IT site representative for incorporation into the project file.

6.5 Entry Requirements

In addition to the entry requirements listed above, no personnel will be allowed on any IT field site unless they are wearing the minimum PPE as described in Chapter 5.0. Personnel entering the EZ or CRZ must wear the required PPE for those locations.

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7.0 Decontamination

The project area will be divided into three work zones: EZ, CRZ, and support zone. The SS will be responsible for designation of the work zones. The contaminated zone will exist only during drilling operations and include the rig, the support truck, and a 20-foot radius around the well hole. The contaminated zone will be marked with barrier tape and will be labeled on each side with the appropriate warning signs.

Only IT personnel and authorized visitors who have completed 40-hour hazardous waste training and who are wearing the required PPE will be allowed within this zone.

Immediately adjacent to the contaminated zone, a decontamination area for equipment and personnel will be established. This area will also be delineated with traffic cones and/or barrier tape. Each side of the decontamination zone will be posted with the following sign: **WORK AREA, NO UNAUTHORIZED ACCESS.**

The remainder of the IT project area will be designated as the support zone. No special markings or warning labels are required for this area.

7.1 Personnel Decontamination

All personnel working in the contaminated zone must undergo decontamination prior to entering the support zone. The personnel decontamination area will consist of the following stations as appropriate.

Station 1. Personnel leaving the contaminated zone will remove the gross contamination from their outer clothing and boots.

Station 2. Plastic-lined waste receptacle. Chair. Clean damp cloths or paper towels. Plastic bags. At Station 2, personnel will remove their Tyvek coveralls and gloves and deposit them in the lined waste receptacles. Personnel will wipe their respirators (if used), hard hats, and boots with clean, damp cloths and then remove those items. Those items are then hand carried to the next station.

Station 3. Wash basin with soap and water; respirator sanitation station. At this station, personnel will thoroughly wash their hands and face before leaving the decontamination zone. Respirators will be sanitized and then placed in a clean plastic ziplock bag.

7.2 Equipment Decontamination

Any vehicles entering the contaminated zone, including the drill rig, will be decontaminated prior to leaving the decontamination zone. If the level of contamination anticipated is low, decontamination for vehicles will be limited to rinsing of tires with water. For sites with significant levels of contamination, steam cleaning or pressure washing of vehicles and equipment will be required. The drill bits and casing will be decontaminated in accordance with procedures in the remediation plan and the contractor's quality control plan.

7.3 Personal Protective Equipment Decontamination

Where and whenever possible, single use, external protective clothing shall be used for work within the EZ or CRZ. This protective clothing shall be disposed of in marked containers. Depending upon subsequent analysis, that protective clothing may require disposal as hazardous waste.

Reusable protective clothing will be rinsed at the site with detergent and water. The rinsate will be collected for possible disposal as hazardous waste.

Respiratory protective equipment will be wiped with a damp cloth while in the CRZ and bagged. Once the respirator has been removed from the CRZ, it will be thoroughly cleaned with soap and water. The respirator face piece will be cleaned at the end of each work shift.

8.0 Site Monitoring

8.1 Air Monitoring

Air monitoring will be conducted at each investigation site to determine employee exposure to airborne contaminants. The monitoring results will dictate the selection and appropriateness of PPE. The monitoring devices to be used, at a minimum, are a combustible gas/oxygen meter and a photoionization detector (PID) or flame ionization detector (FID). Benzene detector tube systems should also be available at each site for follow-up analysis.

Maintenance and calibration requirements for monitoring instruments are given in Table 5.

During initial ground penetration, continuous monitoring with the combustible gas/oxygen meter and either the PID or FID will be conducted. Thereafter, air monitoring will be carried out every half hour. Operations will be discontinued if combustible gas levels exceed 10 percent of the LEL or if oxygen levels drop below 20 percent. The PID or FID will be used to assess the total airborne concentration of VOCs. If the PID or FID reading exceeds 1 part per million (ppm), then the benzene concentration of the air shall be measured using a benzene detector tube.

Periodic industrial hygiene monitoring may be required at the discretion of the SSHO. The purpose of such monitoring is to verify employee compliance with OSHA 1910.1000, other exposure standards, and OSHA 1910.134. Monitoring frequency will be determined by the SSHO. Air samples will be collected and analyzed in accordance with NIOSH Methods 1500 (hydrocarbons) or 1002 (chlorinated hydrocarbons), or other appropriate method. The sampling protocol and all sampling results will be reviewed by the SSHO.

8.1.1 Locations to be Monitored

All personal, integrated air monitoring samples and direct reading instrumentation readings taken for the purpose of determining appropriate H&S precautions shall be collected/taken in the approximate "breathing zone" of the IT or subcontractor employees. The SSHO will be responsible for selecting appropriate individuals anticipated to be at highest risk for potential inhalation of airborne contaminants (i.e., readings should be taken at the approximate head-height of the IT subcontractor employee closest to the sample location or other suspected source of contamination).

All area, integrated air monitoring samples shall be taken from a fixed position at the approximate "breathing zone" height. The SSHO shall be responsible for the specific location of these sampling devices, based on prevailing environmental and site conditions and site activities.

If entry into a confined space is deemed necessary, combustible gas, oxygen, and total organics readings will be collected and recorded from the top, middle, and bottom of the excavation prior to initial entry. Once the IT qualified person and/or SSHO has reviewed this information, determined the PPE necessary for entry, and the entry has been initiated, all readings shall be taken in the approximate "breathing zone" of the IT employee(s) working within the confined space. IT Procedure HS300 will be followed whenever entries are made.

8.1.2 Frequency

Continuous or intermittent area monitoring may be chosen for this project. The monitoring equipment will be positioned at approximately "breathing zone" height to estimate personnel exposure. Readings shall be recorded at least every hour on the IT Real-Time Air Monitoring Log.

If used, personal, integrated air monitoring samples shall be collected during the first full day of site remediation/sampling operations. The SSHO, in consultation with the SS, will be responsible for identifying a day that is anticipated to be indicative of proposed continued operations for the specific site. All samples should be full-shift samples (i.e., collected over at least six hours during the course of site operations) and analyzed within a 24- to 48-hour period. Based on these initial results, the frequency of additional sample collection and analysis will be determined, and the appropriate level of personal protection will be prescribed.

8.1.3 Air Monitoring Equipment

The following equipment, as applicable, will be available for on-site utilization:

- HNU Model PI-101 PID, or equivalent
- MSA combustible gas and oxygen indicator, or equivalent.

All equipment shall be maintained in such quantity and condition to adequately monitor and assess all site operations.

8.2 Noise Monitoring

During the initial phase of drilling operations, the noise exposure of all site personnel will be determined through the use of noise dosimeters and a sound level meter (unless exposure information from operations similar to those anticipated on this project are in the possession of the project SSHO). All noise monitoring equipment will be calibrated against a known sound source, both before and after use. The noise monitoring will be carried out by the SSHO.

8.3 Heat Stress

Heat stress monitoring shall be initiated whenever ambient temperatures on site exceed 85°F. At the discretion of the SSHO, environmental and/or physiologic monitoring will be carried out. Monitoring and interpretation of monitoring results will be in accordance with IT Procedure HS400, "Working in Hot Environments," and Chapter 4.0 of this plan. This is most important when wearing PPE.

8.4 Safety Review

At least once during the project, both the PM and an SHM will carry out a comprehensive on-site safety review of the project. The SS will conduct frequent site safety inspections (no less than once per week). Management safety reviews will be recorded on Safety Inspection Report forms and will be forwarded to the responsible business unit management for review. The SS will record the inspection results on the Safety Inspection Report.

8.5 Monitoring Records

The PM shall ensure that site monitoring records are complete and incorporated into the project file. Any personnel or area air monitoring results will be incorporated into the host office H&S files. The host office project H&S staff will be responsible for establishing, maintaining, and forwarding to other IT offices (as necessary) all required monitoring information as described below:

- Employee name, social security number, and payroll number
- The date, time, pertinent task information, and exposure information
- Description of the analytical methods, equipment used, and calibration data

- Type of PPE worn
- Engineering controls used to reduce exposure.

8.6 Notification

Within five working days after receipt of monitoring results, the project H&S staff and the host office H&S staff will ensure that each employee is informed in writing of the results which represent that employee's exposure. Monitoring results representative of an employee's exposure shall be reported to the affected employee on the IT Employee Notification of Industrial Hygiene Monitoring Results form.

Whenever the results indicate that the representative employee exposure exceeds the permissible exposure limit (PEL), the Employee Notification of Industrial Hygiene Monitoring Results form shall state that the PEL was exceeded and shall provide a description of the corrective action taken to reduce exposure to a level below the PEL.

IT will provide industrial hygiene monitoring results to subcontractor companies, if the exposure of subcontractor employees to airborne contaminants is elevated. Notification of subcontractor personnel of industrial hygiene monitoring results is the responsibility of the subcontractor.

9.0 Employee Training

9.1 General

The SS or a designated representative will be responsible for informing all personnel performing on-site activities and all visitors of the contents of this plan and ensuring that each person signs the SSHP Acknowledgement Form. By signing the SSHP Acknowledgement Form, individuals are recognizing the hazards present on site and the policies and procedures required to minimize exposure to hazards or adverse effects caused by hazards.

All on-site project personnel shall have completed at least 40 hours of hazardous waste operations-related training, as required by OSHA 29 CFR 1910.120. All field employees receive a minimum of three days of actual field experience under the direct supervision of a trained, experienced supervisor. Those personnel who completed the 40-hour training more than 12 months prior to the start of the project shall have completed an 8-hour refresher course within the past 12 months. The SS shall have completed an additional 8 hours of relevant H&S training and shall have a current first-aid/CPR certificate. Subcontractor personnel must meet the above training requirements.

IT provides each employee who completes the required 40 hours of classroom training and 3 days of field experience with a certificate signed by the instructor. A copy of the certificate is maintained in the employee's home business unit training files. Subcontractors must provide certificates of training for the project file for all employees assigned to the project.

9.1.1 Tailgate Safety Meetings

Prior to the start of the project, all personnel will participate in a Tailgate Safety Meeting. During the Tailgate Safety Meeting, the SSHP will be discussed. The SS will ensure that the anticipated site hazards are summarized and explained to all personnel, and that those personnel are aware of the precautions they must take to minimize their exposure to those hazards. Tailgate Safety Meetings will be held at the start of each work shift. All new employees must attend the meeting and be familiar with this SSHP.

Attendance records and meeting notes are maintained with the project files.

9.1.2 Material Safety Data Sheets

The SSHP includes MSDSs and occupational health guidelines for chemical substances known to be on site (Appendix B). The SSHP is maintained on site and is accessible to all site employees. Each employee is required to review and sign the SSHP before starting work on the site.

9.1.3 Site-Specific SSHP

The IT safety department prepares a site-specific SSHP for each project falling within the scope and application of OSHA 29 CFR 1910.120 and IT Procedure HS052. The SS presents the SSHP and discusses it with all personnel assigned to the project. All workers and visitors must read and sign the SSHP, acknowledging acceptance of site rules and understanding of site hazards before the start of the site work.

9.2 Site Workers' Basic Course

The following is a list of the topics covered in IT's 40-hour training course:

- General site safety
- Physical hazards (fall protection, noise, heat stress, cold stress)
- Names and titles of key personnel responsible for site H&S
- Safety, health, and other hazards typically present at hazardous waste sites
- Use of PPE
- Work practices by which employees can minimize risks from hazards
- Safe use of engineering controls and equipment on site
- Medical surveillance requirements including recognition of symptoms and signs which might indicate overexposure to hazards
- Worker right-to-know (Hazard Communication OSHA 1910.1200)
- Routes of exposure to contaminants
- Engineering controls and safe work practices
- Components of the site H&S program

- Decontamination practices for personnel and equipment
- Confined-space entry procedures
- Emergency response plan.

9.3 Supervisors' Course Content

Management and supervisors must receive an additional eight hours of training presented by the IT Training Department that includes:

- General site safety and health programs
- PPE programs
- Air monitoring techniques.

9.4 Site-Specific Training

Site-specific training will be accomplished through a review of this SSHP and the daily Tailgate Safety Meetings.

9.5 First Aid and Cardiopulmonary Resuscitation

At least two employees current in first-aid/CPR will be assigned to the work crew and will be on the site whenever drilling operations are ongoing. First-aid and CPR training courses are offered to all IT employees. Annual refresher training in first aid and CPR is required to maintain the currency of the certificate.

9.6 Instructors

The IT Training Department, headquartered in Irvine, California, teaches the 40-hour hazardous waste operations classes using Certified Environmental Trainers (CET). When training needs exceed the capacity of the training division, IT uses outside institutions. IT is recognized by the EPA and listed in the Federal Register (FR) (53 FR 3982). Only similarly recognized outside training institutions may be used with prior approval of the IT Training Department.

10.0 Medical Surveillance

10.1 Medical Examination

All on-site project personnel shall have completed a comprehensive medical examination within the past 12 months that meets the requirements of OSHA 29 CFR 1910.120 and IT Procedures HS100 and HS101. The annual medical includes the following elements:

- Medical and occupational history questionnaire
- Physical examination
- Complete blood count, with differential
- Liver enzyme profile
- Chest X-ray, once every three years, for nonasbestos workers
- Pulmonary function test
- Audiogram
- Electrocardiogram for persons older than 35 years of age, or if indicated during the physical examination
- Illegal drug screening
- Visual acuity
- Follow-up examinations, at the discretion of the examining physician or the corporate medical director.

All employee medical records are maintained by the H&S staff within the worker's home profit center, or for subcontractors at the subcontractor's office. The examining physician provides the employee with a letter summarizing his findings and recommendations. Each employee also has the right to inspect and copy his medical records.

The examining physician provides the employer with a letter confirming the worker's fitness for work and ability to wear a respirator. A copy of this letter for all project workers will be kept on site during all project site work.

Subcontractors will certify that all their employees have successfully completed a physical examination by a qualified physician on the Certification Form (Appendix A). The physical examinations shall meet the requirements of OSHA 29 CFR 1910.120, 29 CFR 1910.134, and IT procedures. Subcontractors will supply copies of the medical examination certificate for each on-site employee.

10.1.1 Placement Examination

All employees will receive a placement medical examination prior to assignment to field operations.

10.1.2 Annual Examination

Each year, subsequent to the placement examination, all employees and subcontractors must undergo an annual examination, similar in scope to the placement examination. Chest X-rays are taken every third year. The medical and occupational history is updated with each examination.

10.1.3 Exit Examination

IT employees receive an exit examination upon leaving the company if they have not been examined within the previous six months. The exit examination consists of the annual examination without drug screen. The employee's immediate supervisor is to notify the home office H&S staff within a reasonable time before the termination to allow for the necessary arrangements.

10.2 First-Aid and Medical Treatment

All persons on site must report any near-miss incident, accident, injury, or illness to their immediate supervisor or the SS. First aid will be provided by the designated site first aider. Injuries and illnesses requiring medical treatment will be accompanied by an "Authorization for Treatment Form." The employee's supervisor or the SS will complete the "Supervisor's Employee Injury Report" and conduct an accident investigation as soon as emergency conditions no longer exist and first-aid and/or medical treatment has been ensured. The investigation should follow the Accident/Injury Investigation Report. These two reports must be completed and submitted to the SHM within 24 hours after the incident.

If first-aid treatment is required, first-aid kits are kept at the CRZ and in all IT vehicles. If treatment beyond first aid is required, the injured should be transported to the medical facility as shown in Appendix C. If the injured is not ambulatory, or shows any sign of not being in a comfortable and stable condition for transport, then an ambulance/paramedics should be summoned. If there is any doubt as to the injured worker's condition, it is best to let the local paramedic or ambulance service examine and transport the worker.

10.3 Medical Restriction

When a medical care provider identifies a need to restrict work activity, the employee's home office H&S staff will communicate the restriction to the employee, their supervisor, and the office H&S professional. The terms of the restriction will be discussed with the employee and this supervisor. Every attempt will be made to keep the employee working, while not violating the terms of the medical restriction.

10.4 Medical Records

Medical and personal exposure monitoring records will be maintained according to the requirements of OSHA 29 CFR 1910.20 and shall be kept for 30 years postemployment. Employee confidentiality shall be maintained. Employees and their authorized representatives have access to these records through the H&S staff.

11.0 Emergency Procedures

This SSHP has been developed to allow all operations to be conducted without adverse impact to the H&S of project personnel, other personnel, and the environment. Supplementary procedures are included in this section to address extraordinary conditions that might occur at the site.

11.1 General

The SS will establish evacuation routes and assembly areas for each site. All personnel entering the site will be informed of these routes and assembly areas. If the site is large and the evacuation routes not clear, a site plan will be made marking the evacuation routes and will be posted at conspicuous locations.

Each site will be evaluated for the potential for fire, explosion, chemical release, or other catastrophic events. Unusual events, activities, chemicals, and conditions will be reported to the SS.

11.2 Emergency Procedures

If an incident occurs, the following procedures will be used:

- The SS will evaluate the incident and assess the need for assistance
- The SS will call for outside assistance as needed
- The SS will act as liaison between outside agencies and on-site personnel
- The SS will ensure the PM and an SSHO at the nearest IT office are notified promptly of any incident
- The SS will take appropriate measures to stabilize the incident scene.

11.3 Safety Signals

Vehicle or portable air horns will be used for safety signals as follows:

- One long blast: Emergency evacuation of the site
- Two short blasts: Clear working area around powered or moving equipment.

11.4 Medical Emergency

All employee injuries must be promptly reported to the SS. The SS will:

- Ensure that the injured employee receives prompt first aid and medical attention
- Ensure that the PM and General Manager are promptly notified of the incident
- Initiate an investigation of the incident.

11.4.1 Chemical Inhalation

Any employee complaining of symptoms of chemical overexposure as described in Table 1 will be removed from the work area and transported to the designated medical facility for examination and treatment. It is highly unlikely that the chemicals anticipated as being on site, in the concentrations anticipated, would cause situations immediately dangerous to life and health.

11.4.2 Eye Contact

Project personnel who have had contaminants splashed in their eyes or who have experienced eye irritation while in the contaminated zone, shall immediately proceed to the eyewash station, set up in the decontamination zone. Do not decontaminate prior to using the eyewash. Remove whatever protective clothing is necessary to use the eyewash. Flush the eye with clean running water for at least 15 minutes. Arrange prompt transport to the designated medical facility.

11.4.3 Skin Contact

Project personnel who have had skin contact with contaminants will, unless the contact is severe, proceed through the decontamination zone, to the wash-up area. Personnel will remove any contaminated clothing, and then wash the affected area with water for at least 15 minutes. The worker should be transported to the medical facility listed below if they show any sign of skin reddening, irritation, or if they request a medical examination.

11.4.4 Personal Injury Accident

In the event of a personal injury accident, the SS will assess the nature and seriousness of the injury. In the case of serious or life-threatening injuries, normal decontamination procedures may be ignored. Less serious injuries such as strains, sprains, minor cuts, and contusions may only be treated after the employee has been decontaminated.

Following decontamination, an IT project team member qualified in first aid and CPR will administer suitable first aid. The SS will then, if necessary, arrange transport to the appropriate medical facility.

11.5 Fire or Explosions

In the event of a fire greater than incipient stage or explosion, the local fire department should be summoned immediately. Upon their arrival, the SS or designated alternative will advise the fire commander of the location, nature, and identification of hazardous materials on site.

If it is safe to do so, site personnel may:

- Use fire fighting equipment on site
 - Remove or isolate flammable or other hazardous materials which may contribute to the fire.
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11.6 Spills or Leaks

In the event of a spill or leak, site personnel will:

- Notify the local fire department and any other necessary authorities if a reportable quantity is released.
 - Locate or isolate flammable or other hazardous materials which may contribute to the fire
 - Begin containment and recovery of the spilled materials.
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11.7 Evacuation Routes

Evacuation routes have been established by work area locations for this site. All work areas have been provided with designated exit points. Under conditions of extreme emergency, an evacuation should be conducted immediately without regard for equipment.

- Evacuation notification will be a continuous blast on an air horn, vehicle horn, or by verbal communication via radio
- Keep upwind of smoke, vapors, or spill location
- Exit through the decontamination corridor if possible

- If evacuation is not via the decontamination corridor, site personnel should remove contaminated clothing once they are in a location of safety and leave it near the EZ or in a safe place
- Personnel should evacuate to the command post and await instructions at the assembly area.
- The SS will conduct a head count to ensure all personnel have been evacuated safely.

11.8 Emergency Information

Prior to the start of the project, contact will be made with local authorities and emergency services to establish communication channel during an event of emergency and to familiarize the project personnel with the communication procedure and services.

11.8.1 Public Agencies

FIRE/POLICE	Naples Fire Dept./Police Dept. Emergency Nonemergency	F 911 (801) 789-4222
POLICE	Vernal Police Emergency Nonemergency	A 911 (801) 789-5835
HOSPITAL	Ashley Valley Medical Center Emergency Nonemergency	D 911 (801) 789-3343

11.8.2 Key Project and IT Personnel

Program Director	Enzo Zoratto	(412) 372-7701
Program Manager	Al Meyers	(513) 782-4505
Project Manager	Tom Mathison	(412) 372-7701
Site Supervisor	Dean Robb	(303) 793-5200
Program H&S Manager	Warren Houseman	(412) 372-7701
Nearest IT Office General Manager	Greg Williams	(303) 793-5200

Site Phone Number
Site Fax

(801) 789-1411 or 1606
(801) 789-1712

Occupational Physician

Peter M. Greaney, M.D.
Greaney Medical Group
1103 S. Anaheim Boulevard
Anaheim, California 92805

(213) 603-4426

Client Contact

Larry Leahy
U.S. Army Corps of Engineers

(402) 221-7770

Greg Wagner
U.S. Army Corps of Engineers

(402) 241-4260

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12.0 Record Keeping and Data Management

Proper record keeping and data management is essential in the implementation of this SSHP. The forms associated with the record keeping and data management requirements must be completed in an accurate, timely fashion and filed with the appropriate entities. It is the responsibility of the SS to ensure that the forms are properly completed. Completed forms will be kept and maintained by IT. These records shall be maintained for a five-year period. Subcontractors will also be responsible for keeping a copy of the forms pertaining to their personnel.

A listing of records to be completed and maintained relative to work at the facility is contained below:

- Training:
 - Respiratory Training Completion Form
 - Tailgate Safety Meeting
 - On-The-Job Training Record (OJTR).
- Medical Records:
 - Medical Examination
 - Supervisor's Employee Injury Report.
- Monitoring:
 - Real-Time Air Monitoring Log
 - Calibration Log
 - Employee notification of results of monitoring for exposure to hazardous substances or harmful physical agents.
- Other Forms:
 - Vehicle Accident Report. Upon occurrence of any accident involving a vehicle. It is very important to obtain information about involved outside parties. The form must be submitted to the appropriate office within 24 hours. Additional information, e.g., police report, is to be forwarded as it becomes available.
 - General Liability, Property Damage, and Loss Report. This form is used to record damage or loss of equipment outside of vehicle accidents (theft, accidental breakage, fire). The procedure for completing and submitting this form is the same as for the vehicle accident report.

- OSHA 200 Form. Injury/illness information from the Supervisor's Employee Injury Report will be logged on an OSHA 200 Form within 6 work days from the occurrence of the incident. The OSHA 200 Form will be maintained at the central fixed location of the IT Pittsburgh Remediation Services Office, 2790 Mossdale Boulevard, Monroeville, Pennsylvania 15146 (Phone: (412) 372-7701). The SS and SSHO can contact the office for this information. Also, an OSHA 2203 poster will be posted in the break area/ command post.

In addition, the SS will keep daily logs which will include the following items:

- Date
- Activity description
- Area (site specific) checked
- Employees in a particular area
- Protective clothing being worn by employees
- Protective devices (including monitoring equipment) being used by employees
- Signature and date.

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TABLES A

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Table 1
Chemical Hazards

Contaminant (Synonym)	Physical/Chemical Characteristics (Target Organs/Route of Entry)	Limit Value (ppm)		
		PEL	TLV	IDLH
Benzene	A human poison by inhalation. A severe eye and moderate skin irritant. A human carcinogen that produces myeloid leukemia and lymphomas by inhalation. Poisoning occurs most commonly via inhalation of the vapor, although benzene can penetrate the skin and cause poisoning. Locally, benzene has a comparatively strong irritating effect, producing erythema and burning, and, in more severe cases, edema and even blistering.	1	10	3,000
Ethyl benzene	Moderate toxic by ingestion and intraperitoneal route. Mildly toxic by inhalation and skin contact. Human systemic effects by inhalation. An eye and skin irritant.	100	100	2,000
Toluene	Poison by intraperitoneal route. Moderate toxic by intravenous, subcutaneous, and possibly other routes. Mildly toxic by inhalation. Inhalation of 200 ppm of toluene for 8 hours may cause impairment concentration (up to 800 ppm) these effects are increasing and are observed in a shorter time.	100	100	2,000
Xylene	Moderately toxic by intraperitoneal and subcutaneous routes. Mildly toxic by ingestion and inhalation. A human eye irritant, irritation can start at 200 ppm.	100	100	1,000

Table 2
Task-Specific PPE Selection

Activity	Level of Protection	Special Requirements
Task 1	Level D	Use chemical protective boot covers, gloves and apron. Upgrade to Level C if air monitoring action level mandates.
Task 2	Level D	Use chemical protective boot covers, gloves, and apron when working with potentially contaminated material (minimize skin contact). Routine air monitoring/sampling. Upgrade monitoring action level to Level C if air mandates.
Task 3		
Task 4	Level D	Routine air monitoring upgrade to Level C if air monitoring is consistently above background.
Task 5	Level D	Routine air monitoring upgrade to Level C if air monitoring is consistently above background.
Task 6	Level D	Routine air monitoring upgrade to Level C if air monitoring is consistently above background.

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Table 3
Flying Insects

Organism	Description	Habitat	Problem	Severity	Protection
Hornet	One inch long with some body hair. Abdomen is mostly black.	Round, paper-like nest hanging from trees, shrubs, or under eaves of buildings.	One nest may contain up to 100,000 hornets which will attack in force at the slightest provocation.	Severe pain, allergic reactions similar to bees.	Do not come near or disturb nest. If a hornet investigates you, do not move.
Mosquito	Small, dark, fragile body with transparent wings. From 1/8 to 1/4 inch long.	Where water is available for breeding.	Bites and sucks blood. Itching and swelling result.	Can transmit encephalitis and other diseases. Scratching causes secondary infections.	Use plenty of insect repellent and wear gloves. Stay in windy areas.
Wasp	Very thin waist. Color can be black, yellow or orange with stripes.	Underground nest. Paper-like honeycomb nest in abandoned buildings hollow trees, etc.	Stings. Some species will attack if you get too close to the nest.	Severe pain, allergic reactions similar to bees. Can be fatal.	Avoid Nest. Do not swat at them.
Bee	Generally has yellow and black stripes and two pair of wings.	Hollow logs, underground nest, old buildings,	Stings when annoyed. Leaves venom sac in victim.	If person is allergic, nausea, shock, constriction of the airway can result. Death may result.	Be careful and watch where you walk. Cover exposed skin. Avoid areas where bees are swarming. Avoid wearing sweet fragrances and bright clothing. Move slowly or stand still when bees are swarming about you.

Table 4
PPE Selection Matrix

Level of Protection	OVA or HNU Reading	Identified Air Contaminant	Task Specific
Level D	<1 ppm	<1/2 PEL	Routine materials handling
Level C	<10 ppm	<2 PEL	Sampling containers of unknown materials of low volatility

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Table 5
Calibration and Maintenance of Field Sampling Equipment

Monitor Type	Calibration Method	Calibration Frequency	Maintenance Schedule
Combustible gas indicator/oxygen meter	CGI sensor calibrated against known concentration of hexane (demonstration bottle). Zero setting checked in noncontaminated air. Oxygen sensor calibrated daily to 20.8 percent in fresh noncontaminated air.	CGI span calibrated once per month. CGI zero checked daily. Oxygen sensor calibrated daily.	Instrument cleaned as needed and no less than annually. Oxygen sensor changed annually. CGI sensor checked annually and changed if necessary.
PID	PID zeroed in clean air. Span calibrated using known concentration of isobutylene (demonstration bottle).	PID zeroed and span checked daily at start of work day.	Annual cleaning by qualified technician. Annual calibration of electronics by qualified technician. Clean lamp if sensitivity drops or if used in very dusty environment.
Draeger tube sampling system	Check air tightness of pump by inserting unbroken tube. Compress bellows pump, time for one minute, chain should remain slack. If chain taut, then maintenance required.	Check daily prior to start of workday.	Maintenance required whenever pump fails to pass leak test. Replace seals and/or lubricate per instruction manual.
Air sampling pump	Verify airflow using primary standard (bubble meter) or precalibrated rotameter.	Verify airflow prior to and after use, with sampling head in place. Spot check flow rate throughout sampling period.	Minimum of annual cleaning. Clean whenever pump unable to hold flow rate. Maintenance required if pump will not hold charge or if flow rate is erratic.
Sound level meter	Calibrate using known noise source (manufacturer supplied acoustic calibrator). Check battery level within recommended limits.	Calibrate meter and check battery daily prior to use.	Annual cleaning by qualified technician. Maintenance required if meter fails to calibrate.

APPENDIX A
SUBCONTRACTOR CERTIFICATION

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SUBCONTRACTOR CERTIFICATION

I, _____ as an agent of _____,
do hereby certify that the following employees have successfully completed a 40-hour training
course which complies with the provisions of 29 CFR 1910.120, and respiratory protection
training which complies with 29 CFR 1910.134. Each employee has successfully completed a
medical examination which complies with the above regulations.

Individual copies of certification of successful completion of the required training and medical
examinations are attached for each employee.

Signature _____

_____ Date

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APPENDIX B
CHEMICAL INFORMATION

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Genium Publishing Corporation

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Material Safety Data Sheets Collection:

Sheet No. 316
Benzene

Issued: 11/78

Revision: E, 8/90

Section 1. Material Identification

Benzene (C₆H₆) Description: Derived by fractional distillation of coal tar, hydrodealkylation of toluene or pyrolysis of gasoline, catalytic reforming of petroleum, and transalkylation of toluene by disproportionation reaction. Used as a fuel; a chemical reagent; a solvent for a large number of materials such as paints, plastics, rubber, inks, oils, and fats; in manufacturing phenol, ethylbenzene (for styrene monomer), nitrobenzene (for aniline), dodecylbenzene (for detergents), cyclohexane (for nylon), chlorobenzene, diphenyl, benzene hexachloride, maleic anhydride, benzene-sulfonic acid, artificial leather, linoleum, oil cloth, varnishes, and lacquers; for printing and lithography; in dry cleaning; in adhesives and coatings; for extraction and rectification; as a degreasing agent; in the tire industry; and in shoe factories. Benzene has been banned as an ingredient in products intended for household use and is no longer used in pesticides.

Other Designations: CAS No. 0071-43-2, benzol, carbon oil, coal naphtha, cyclohexatriene, mineral naphtha, nitration benzene, phene, phenyl hydride, pyrobenzol.

Manufacturer: Contact your supplier or distributor. Consult the latest *Chemicalweek Buyers' Guide*⁽⁷³⁾ for a suppliers list.

R	1	NFPA
I	4	
S	2*	
K	4	
*Skin absorption		
HMIS		
H	3	
F	3	
R	0	
PPG†		
† Sec. 8		

Cautions: Benzene is a confirmed *human carcinogen* by the IARC. *Chronic low-level exposure may cause cancer (leukemia) and bone marrow damage, with injury to blood-forming tissue.* It is also a dangerous fire hazard when exposed to heat or flame.

Section 2. Ingredients and Occupational Exposure Limits

Benzene, ca 100%*

1989 OSHA PELs

(29 CFR 1910.1000, Table Z-1-A)

8-hr TWA: 1 ppm, 3 mg/m³

15-min STEL: 5 ppm, 15 mg/m³

(29 CFR 1910.1000, Table Z-2)

8-hr TWA: 10 ppm

Acceptable Ceiling Concentration: 25 ppm

Acceptable Maximum Peak: 50 ppm (10 min)†

1989-90 ACGIH

TLV-TWA: 10 ppm, 32 mg/m³

1988 NIOSH RELs

TWA: 0.1 ppm, 0.3 mg/m³

Ceiling: 1 ppm, 3 mg/m³

1985-86 Toxicity Data‡

Man, oral, LD₅₀: 50 mg/kg; no toxic effect noted

Man, inhalation, TC₅₀: 150 ppm inhaled intermittently over 1 yr in a number of discrete, separate doses affects the blood (other changes) and nutritional and gross metabolism (body temperature increase)

Rabbit, eye: 2 mg administered over 24 hr produces severe irritation

* OSHA 29 CFR 1910.1000, Subpart Z, states that the final benzene standard in 29 CFR 1910.1028 applies to all occupational exposures to benzene except in some subsegments of industry where exposures are consistently under the action level (i.e., distribution and sale of fuels, sealed containers and pipelines, coke production, oil and gas drilling and production, natural gas processing, and the percentage exclusion for liquid mixtures); for the excepted subsegments, the benzene limits in Table Z-2 apply.

† Acceptable maximum peak above the acceptable ceiling concentration for an 8-hr shift.

‡ See NIOSH, RTECS (CY1400000), for additional irritative, mutative, reproductive, tumorigenic, and toxicity data.

Section 3. Physical Data

Boiling Point: 176 °F (80 °C)

Melting Point: 42 °F (5.5 °C)

Vapor Pressure: 100 mm Hg at 79 °F (26.1 °C)

Vapor Density (Air = 1): 2.7

Evaporation Rate (Ether = 1): 2.8

Molecular Weight: 78.11

Specific Gravity (15 °C/4 °C): 0.8787

Water Solubility: Slightly (0.180 g/100 g of H₂O at 25 °C)

% Volatile by Volume: 100

Viscosity: 0.6468 mPa at 20 °C

Appearance and Odor: A colorless liquid with a characteristic sweet, aromatic odor. The odor recognition threshold (100% of panel) is approximately 5 ppm (unfatigued) in air. Odor is *not* an adequate warning of hazard.

Section 4. Fire and Explosion Data

Flash Point: 12 °F (-11.1 °C), CC

Autoignition Temperature: 928 °F (498 °C)

LEL: 1.3% v/v

UEL: 7.1% v/v

Extinguishing Media: Use dry chemical, foam, or carbon dioxide to extinguish benzene fires. Water may be ineffective as an extinguishing agent since it can scatter and spread the fire. Use water spray to cool fire-exposed containers, flush spills away from exposures, disperse benzene vapor, and protect personnel attempting to stop an unignited benzene leak.

Unusual Fire or Explosion Hazards: Benzene is a Class 1B flammable liquid. A concentration exceeding 3250 ppm is considered a potential fire explosion hazard. Benzene vapor is heavier than air and can collect in low lying areas or travel to an ignition source and flash back. Explosive and flammable benzene vapor-air mixtures can easily form at room temperature. Eliminate all ignition sources where benzene is used, handled, or stored.

Special Fire-fighting Procedures: Isolate hazard area and deny entry. Since fire may produce toxic fumes, wear a self-contained breathing apparatus (SCBA) with a full facepiece operated in the pressure-demand or positive-pressure mode and full protective equipment. Structural firefighter's protective clothing provides limited protection. Stay out of low areas. Be aware of runoff from fire control methods. Do not release to sewers or waterways. Runoff to sewer can create pollution, fire, and explosion hazard.

Section 5. Reactivity Data

Stability/Polymerization: Benzene is stable at room temperature in closed containers under normal storage and handling conditions. Hazardous polymerization cannot occur.

Chemical Incompatibilities: Benzene explodes on contact with diborane, permanganic acid, bromine pentafluoride, peroxodisulfuric acid, and peroxomonosulfuric acid. It ignites on contact with dioxygen difluoride, dioxygenyl tetrafluoroborate, iodine heptafluoride, and sodium peroxide + water. Benzene forms sensitive, explosive mixture with iodine pentafluoride, ozone, liquid oxygen, silver perchlorate, nitryl perchlorate, nitric acid, and arsenic pentafluoride + potassium methoxide (explodes above 30 °C). A vigorous or incandescent reaction occurs with bromine trifluoride, uranium hexafluoride, and hydrogen + Raney nickel (above 410 °F (210 °C)). Benzene is incompatible with oxidizing materials.

Conditions to Avoid: Avoid heat and ignition sources.

Hazardous Products of Decomposition: Thermal oxidative decomposition of benzene can produce toxic gases and vapors such as carbon monoxide.



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Material Safety Data Sheets Collection:

Sheet No. 385
Ethylbenzene

Issued: 8/78

Revision: B, 9/92

Section 1. Material Identification

Ethylbenzene ($C_8H_5C_2H_5$) Description: Derived by heating benzene and ethylene in presence of aluminum chloride with subsequent distillation, by fractionation directly from the mixed xylene stream in petroleum refining, or dehydrogenation of naphthenes. Used as a solvent, an antiknock agent in gasoline; and as an intermediate in production of synthetic rubber, styrene, cellulose acetate, diethylbenzene, acetophenone, ethyl anthraquinone, propyl oxide, and α -methylbenzol alcohol. **Other Designations:** CAS No. 100-41-4, ethylbenzol, EB, phenylethane, NCI-C56393.

Manufacturer: Contact your supplier or distributor. Consult latest *Chemical Week Buyers' Guide*⁽⁷³⁾ for a suppliers list.

R 1	NFPA
I 3	3
S 2*	2
K 4	0
* Skin absorption	HMIS
	H 2†
	F 3
	R 0
	PPE - Sec. 8
	† Chronic effects

Cautions: Ethylbenzene is a skin and mucous membrane irritant considered the most irritating of the benzene series. Inhalation causes acute and chronic central nervous system (CNS) effects. It is highly flammable and forms explosive mixtures with air.

Section 2. Ingredients and Occupational Exposure Limits

Ethylbenzene, ca >99.0%. Impurities include ~0.1% *meta* & *para* xylene, ~0.1% cumene, and ~0.1% toluene.

1991 OSHA PELs

8-hr TWA: 100 ppm (435 mg/m³)
15-min STEL: 125 ppm (545 mg/m³)
Action Level: 50 ppm (217 mg/m³)

1990 IDLH Level

2000 ppm

1990 NIOSH REL

TWA: 100 ppm (435 mg/m³)
STEL: 125 ppm (545 mg/m³)

1992-93 ACGIH TLVs

TWA: 100 ppm (434 mg/m³)
STEL: 125 ppm (545 mg/m³)

1990 DFG (Germany) MAK

TWA: 100 ppm (440 mg/m³)
Category 1: local irritants
Peak Exposure Limit: 200 ppm, 5 min
momentary value, max of 8/shift
Danger of cutaneous absorption

1985-86 Toxicity Data*

Human, inhalation, TC_{Lo}: 100 ppm/8 hr caused eye effects, sleep, and respiratory changes.

Human, lymphocyte: 1 mmol/L induced sister chromatid exchange.

Rat, oral, LD₅₀: 3500 mg/kg; toxic effects not yet reviewed

Rat (female), inhalation, TC_{Lo}: 1000 ppm/7 hr/day, 5 days/wk, for 3 wk prior to mating and daily for 19 days of gestation produced pups with high incidence of extra ribs.⁽¹⁷⁹⁾

* See NIOSH, RTECS (DA0700000), for additional irritation, mutation, reproductive, and toxicity data.

Section 3. Physical Data

Boiling Point: 277 °F (136 °C)
Melting Point: -139 °F (-95 °C)
Surface Tension: 31.5 dyne/cm
Ionization Potential: 8.76 eV
Viscosity: 0.64 cP at 77 °F (25 °C)
Refraction Index: 1.4959 at 68 °F (20 °C)
Relative Evaporation Rate (ether = 1): 0.0106
Bulk Density: 7.21 lb/Gal at 77 °F (25 °C)
Critical Temperature: 651 °F (343.9 °C)
Critical Pressure: 35.6 atm

Molecular Weight: 106.16

Density: 0.863 at 77 °F (25 °C)

Water Solubility: Slightly, 14 mg/100 mL at 59 °F (15 °C)

Other Solubilities: Miscible in alcohol, ether; soluble in carbon tetrachloride, benzene, sulfur dioxide, and many organic solvents; insoluble in ammonia

Odor Threshold: 2.3 ppm

Vapor Pressure: 7.1 mm Hg at 68 °F (20 °C); 10 mmHg at 78.62 °F (25.9 °C); 100 mm Hg 165.38 °F (74.1 °C)

Saturated Vapor Density (Air = 0.075 lb/ft³ or 1.2 kg/m³): 0.0768 lb/ft³ or 1.2298 kg/m³

Appearance and Odor: Colorless, flammable liquid with a pungent odor.

Section 4. Fire and Explosion Data

Flash Point: 64 °F (18 °C) CC

Autoignition Temperature: 810 °F (432 °C)

LEL: 1.0% v/v

UEL: 6.7% v/v

Extinguishing Media: Class 1B Flammable liquid. For small fires, use dry chemical, carbon dioxide, or 'alcohol-resistant' foam. For large fires, use fog or 'alcohol-resistant' foam. Use water only if other agents are unavailable; EB floats on water and may travel to an ignition source and spread fire. **Unusual Fire or Explosion Hazards:** Burning rate = 5.8 mm/min. Vapors may travel to an ignition source and flash back. Container may explode in heat of fire. EB poses a vapor explosion hazard indoors, outdoors, and in sewers. **Special Fire-fighting Procedures:** Because fire may produce toxic thermal decomposition products, wear a self-contained breathing apparatus (SCBA) with a full facepiece operated in pressure-demand or positive-pressure mode. Cool container sides with water until well after fire is out. Stay away from ends of tanks. For massive fire in cargo area, use monitor nozzles or unmanned hose holders; if impossible, withdraw from area and let fire burn. Withdraw immediately if you hear rising sound from venting safety device or notice any tank discoloration due to fire. Do not release runoff from fire control methods to sewers or waterways.

Section 5. Reactivity Data

Stability/Polymerization: Ethylbenzene is stable at room temperature in closed containers under normal storage and handling conditions. Hazardous polymerization cannot occur.

Chemical Incompatibilities: Reacts vigorously with oxidizers.

Conditions to Avoid: Exposure to heat and oxidizers.

Hazardous Products of Decomposition: Thermal oxidative decomposition of EB can produce acrid smoke and irritating fumes.

Section 6. Health Hazard Data

Carcinogenicity: The IARC,⁽¹⁶⁴⁾ NTP,⁽¹⁶⁹⁾ and OSHA⁽¹⁶⁴⁾ do not list EB as a carcinogen. **Summary of Risks:** Occupational exposure to EB alone is rare since it is usually present together with other solvents. EB is irritating to the eyes, skin, and respiratory tract. Vapor inhalation produces varying degrees of CNS effects depending on concentration. The liquid is absorbed through the skin but vapors are not. 56 to 64% of inhaled ethylbenzene is retained and metabolized. Urinary metabolites following exposure to 23 to 85 ppm for 8 hr are mandelic acid (64%), phenylglyoxylic acid (25%), and methylphenylcarbinol/1-phenyl ethanol (5%). Concurrent exposure to xylene and ethylbenzene causes slower excretion of EB metabolites. Based on the rat LD₅₀, one manufacturer gives 3 to 4 oz. as the lethal dose for a 100 lb person.

Continue on next page



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Material Safety Data Sheets Collection:

Sheet No. 317

Toluene

Issued: 8/79

Revision: E, 9/92

Section 1. Material Identification

39

Toluene ($C_6H_5CH_3$) Description: Derived from petroleum i.e., dehydrogenation of cycloparaffin fractions followed by the aromatization of saturated aromatic hydrocarbons or by fractional distillation of coal-tar light oil and purified by rectification. Used widely as a solvent (replacing benzene in many cases) for oils, resins, adhesives, natural rubber, coal tar, asphalt, pitch, acetyl celluloses, cellulose paints and varnishes; a diluent for photogravure inks, raw material for organic synthesis (benzoyl & benzilidene chlorides, saccharine, TNT, toluene diisocyanate, and many dyestuffs), in aviation and high octane automobile gasoline, as a nonclinical thermometer liquid and suspension solution for navigational instruments.

Other Designations: CAS No. 108-88-3, Methacide, methylbenzene, methylbenzol, phenylmethane, toluol, Tolu-sol.

Manufacturer: Contact your supplier or distributor. Consult latest *Chemical Week Buyers' Guide*⁽⁷³⁾ for a suppliers list.

Cautions: Toluene is an eye, skin, and respiratory tract irritant becoming narcotic at high concentrations. Liver and kidney damage has occurred. Pregnant women chronically exposed to toluene have shown teratogenic effects. Toluene is highly flammable.

R	1	NFPA
I	3	
S	2*	
K	3	
* Skin absorption		
HMIS		
H	2-	Chronic effects
F	3	
R	0	
PPE-Sec. 8		

Section 2. Ingredients and Occupational Exposure Limits

Toluene, < 100%; may contain a small amount of benzene (~ 1%), xylene, and nonaromatic hydrocarbons.

1991 OSHA PELs

8-hr TWA: 100 ppm (375 mg/m³)

15-min STEL: 150 ppm (560 mg/m³)

1990 IDLH Level

2000 ppm

1990 NIOSH RELs

TWA: 100 ppm (375 mg/m³)

STEL: 150 ppm (560 mg/m³)

1992-93 ACGIH TLV (Skin)

TWA: 50 ppm (188 mg/m³)

1990 DFG (Germany) MAK*

TWA: 100 ppm (380 mg/m³)

Half-life: 2 hr to end of shift

Category II: Substances with systemic effects

Peak Exposure Limit: 500 ppm, 30 min

average value, 2/shift

1985-86 Toxicity Data†

Man, inhalation, TC_{Lo}: 100 ppm caused hallucinations, and changes in motor activity and changes in psychophysiological tests.

Human, oral, LD_{Lo}: 50 mg/kg; toxic effects not yet reviewed

Human, eye: 300 ppm caused irritation.

Rat, oral, LD₅₀: 5000 mg/kg

Rat, liver: 30 µmol/L caused DNA damage.

* Available information suggests damage to the developing fetus is probable.

† See NIOSH, RTECS (XSS250000), for additional irritation, mutation, reproductive, and toxicity data.

Section 3. Physical Data

Boiling Point: 232 °F (110.6 °C)

Melting Point: -139 °F (-95 °C)

Molecular Weight: 92.15

Density: 0.866 at 68 °F (20/4 °C)

Surface Tension: 29 dyne/cm at 68 °F (20 °C)

Viscosity: 0.59 cP at 68 °F (20 °C)

Refraction Index: 1.4967 at 20 °C/D

Water Solubility: Very slightly soluble, 0.6 mg/L at 68 °F (20 °C)

Other Solubilities: Soluble in acetone, alcohol, ether, benzene, chloroform, glacial acetic acid, petroleum ether, and carbon disulfide.

Vapor Pressure: 22 mm Hg at 68 °F (20 °C); 36.7 mm Hg at 86 °F (30 °C)

Saturated Vapor Density (Air = 0.075 lb/ft³ or 1.2 kg/m³): 0.0797 lb/ft³ or 1.2755 kg/m³

Odor Threshold (range of all referenced values): 0.021 to 69 ppm

Appearance and Odor: Colorless liquid with a sickly sweet odor.

Section 4. Fire and Explosion Data

Flash Point: 40 °F (4.4 °C) CC

Autoignition Temperature: 896 °F (480 °C)

LEL: 1.27% v/v

UEL: 7.0% v/v

Extinguishing Media: Toluene is a Class 1B flammable liquid. To fight fire, use dry chemical carbon dioxide, or 'alcohol-resistant' foam. Water spray may be ineffective as toluene floats on water and may actually spread fire. **Unusual Fire or Explosion Hazards:** Concentrated vapors are heavier than air and may travel to an ignition source and flash back. Container may explode in heat of fire. Toluene's burning rate = 5.7 mm/min and its flame speed = 37 cm/sec. Vapor poses an explosion hazard indoors, outdoors, and in sewers. May accumulate static electricity. **Special Fire-fighting Procedures:** Because fire may produce toxic thermal decomposition products, wear a self-contained breathing apparatus (SCBA) with a full facepiece operated in pressure-demand or positive-pressure mode. Structural firefighter's protective clothing provides only limited protection. Apply cooling water to sides of tanks until well after fire is out. Stay away from ends of tanks. For massive fire in cargo area, use monitor nozzles or unmanned hose holders; if impossible, withdraw from fire and let burn. Withdraw immediately if you hear a rising sound from venting safety device or notice any tank discoloration due to fire because a BLEVE (boiling liquid expanding vapor explosion) may be imminent. Do not release runoff from fire control methods to sewers or waterways.

Section 5. Reactivity Data

Stability/Polymerization: Toluene is stable at room temperature in closed containers under normal storage and handling conditions. Hazardous polymerization can't occur. **Chemical Incompatibilities:** Strong oxidizers, concentrated nitric acid, nitric acid + sulfuric acid, dinitrogen tetroxide, silver perchlorate, bromine trifluoride, tetranitromethane, and 1,3-dichloro-5,5-dimethyl-2,4-imidazolididione. **Conditions to Avoid:** Contact with heat, ignition sources, or incompatibles. **Hazardous Products of Decomposition:** Thermal oxidative decomposition of toluene can produce carbon dioxide, and acid, irritating smoke.

Section 6. Health Hazard Data

Carcinogenicity: The IARC,⁽¹⁶⁴⁾ NTP,⁽¹⁶⁹⁾ and OSHA⁽¹⁶⁴⁾ do not list toluene as a carcinogen. **Summary of Risks:** Toluene is irritating to the eyes, nose, and respiratory tract. Inhalation of high concentrations produces a narcotic effect sometimes leading to coma as well as liver and kidney damage. 93% of inhaled toluene is retained in the body of which 80% is metabolized to benzoic acid, then to hippuric acid and excreted in urine. The remainder is metabolized to o-cresol and excreted or exhaled unchanged. Toluene metabolism is inhibited by alcohol ingestion and is synergistic with benzene, asphalt fumes, or chlorinated hydrocarbons (i.e. perchloroethylene). Toluene is readily absorbed through the skin at 14 to 23 mg/cm²/hr. Toluene is absorbed quicker during exercise than at rest and appears to be retained longer in obese versus thin victims; presumably due to its lipid solubility. There is inconsistent data on toluene's ability to damage bone marrow; chronic poisoning has resulted in anemia and leucopenia with biopsy showing bone marrow hypo-plasia. These reports are few and some authorities argue that the effects may have been due to benzene contaminants. Chronic inhalation during pregnancy has been associated with teratogenic effects on the fetus including microcephaly, CNS dysfunction, attentional deficits, developmental delay + language impairment, growth retardation, and physical defects including a small midface, short palpebral fissures, with deep-set eyes, low-set ears, flat nasal bridge with a small nose, micrognathia, and blunt fingertips. There is some evidence that toluene causes an autoimmune illness in which the body produces antibodies that cause inflammation of its own kidney.

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Material Safety Data Sheets Collection:

Sheet No. 318
Xylene (Mixed Isomers)

Issued: 11/80

Revision: E, 9/92

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Section 1. Material Identification

Xylene (Mixed Isomers) (C_8H_{10}) Description: The commercial product is a blend of the three isomers [*ortho*-(*o*-), *meta*-(*m*-), *para*-(*p*-)] with the largest proportion being *m*-xylene. Xylene is obtained from coal tar, toluene by transalkylation, and pseudocumene. Used in the manufacture of dyes, resins, paints, varnishes, and other organics; as a general solvent for adhesives, a cleaning agent in microscope technique; as a solvent for Canada balsam microscopy; as a fuel component; in aviation gasoline, protective coatings, sterilizing catgut, hydrogen peroxide, perfumes, insect repellants, pharmaceuticals, and the leather industry; in the production of phthalic anhydride, isophthalic, and terephthalic acids and their dimethyl esters which are used in the manufacture of polyester fibers; and as an indirect food additive as a component of adhesives. Around the home, xylene is found as vehicles in paints, paint removers, degreasing cleaners, lacquers, glues and cements and as solvent/vehicles for pesticides.

Other Designations: CAS No. 1330-20-7 [95-47-6; 108-38-3; 106-42-3 (*o*-, *m*-, *p*-isomers)], dimethylbenzene, methyltoluene, NCI-C55232, Violet 3, xylol.

Manufacturer: Contact your supplier or distributor. Consult latest *Chemical Week Buyers' Guide*⁽⁷³⁾ for a suppliers list.

Cautions: Xylene is an eye, skin, and mucous membrane irritant and may be narcotic in high concentrations. It is a dangerous fire hazard.

R	1	NFPA
I	2	
S	2	
K	3	
HMIS		
H	2+	
F	3	
R	0	
PPE	+	
† Chronic Effects		
		† Sec. 8

Section 2. Ingredients and Occupational Exposure Limits

Xylene (mixed isomers): the commercial product generally contains ~ 40% *m*-xylene; 20% each of *o*-xylene, *p*-xylene, and ethylbenzene; and small quantities of toluene. Unpurified xylene may contain pseudocumene.

1991 OSHA PELs

8-hr TWA: 100 ppm (435 mg/m³)
15-min STEL: 150 ppm (655 mg/m³)

1990 IDLH Level

1000 ppm

1990 NIOSH RELs

TWA: 100 ppm (435 mg/m³)
STEL: 150 ppm (655 mg/m³)

1992-93 ACGIH TLVs

TWA: 100 ppm (434 mg/m³)
STEL: 150 ppm (651 mg/m³)
BEI (Biological Exposure Index): Methylhippuric acids in urine at end of shift: 1.5 g/g creatinine

1990 DFG (Germany) MAK

TWA: 100 ppm (440 mg/m³)
Category II: Substances with systemic effects
Half-life: < 2 hr
Peak Exposure: 200 ppm, 30 min, average value, 4 peaks per shift

1985-86 Toxicity Data*

Human, inhalation, TC_{Lo}: 200 ppm produced olfaction effects, conjunctiva irritation, and other changes involving the lungs, thorax, or respiration. Man, inhalation, LC_{Lo}: 10000 ppm/6 hr; toxic effects not yet reviewed. Human, oral, LD_{Lo}: 50 mg/kg; no toxic effect noted. Rat, oral, LD₅₀: 4300 mg/kg; toxic effect not yet reviewed. Rat, inhalation, LC₅₀: 5000 ppm/4 hr; toxic effects not yet reviewed.

* See NIOSH, RTECS (XE2100000), for additional toxicity data.

Section 3. Physical Data

Boiling Point Range: 279 to 284 °F (137 to 140 °C)*

Boiling Point: *ortho*: 291 °F (144 °C); *meta*: 281.8 °F (138.8 °C); *para*: 281.3 °F (138.5 °C)

Freezing Point/Melting Point: *ortho*: -13 °F (-25 °C); *meta*: -53.3 °F (-47.4 °C); *para*: 55 to 57 °F (13 to 14 °C)

Vapor Pressure: 6.72 mm Hg at 70 °F (21 °C)

Saturated Vapor Density (Air = 1.2 kg/m³): 1.23 kg/m³, 0.077 lbs/ft³

Appearance and Odor: Clear, sweet-smelling liquid.

* Materials with wider and narrower boiling ranges are commercially available.

Molecular Weight: 106.16

Specific Gravity: 0.864 at 20 °C/4 °C

Water Solubility: Practically insoluble

Other Solubilities: Miscible with absolute alcohol, ether, and many other organic liquids.

Octanol/Water Partition Coefficient: logKow = 3.12-3.20

Odor Threshold: 1 ppm

Viscosity: <32.6 SUS

Section 4. Fire and Explosion Data

Flash Point: 63 to 77 °F (17 to 25 °C) CC | **Autoignition Temperature:** 982 °F (527 °C) (*m*-) | **LEL:** 1.1 (*m*-, *p*-); 0.9 (*o*-) | **UEL:** 7.0 (*m*-, *p*-); 6.7 (*o*-)

Extinguishing Media: For small fires, use dry chemical, carbon dioxide (CO₂), water spray or regular foam. For large fires, use water spray, fog or regular foam. Water may be ineffective. Use water spray to cool fire-exposed containers. **Unusual Fire or Explosion Hazards:** Xylene vapors or liquid (which floats on water) may travel to an ignition source and flash back. The heat of fire may cause containers to explode and/or produce irritating or poisonous decomposition products. Xylene may present a vapor explosion hazard indoors, outdoors, or in sewers. Accumulated static electricity may occur from vapor or liquid flow sufficient to cause ignition. **Special Fire-fighting Procedures:** Because fire may produce toxic thermal decomposition products, wear a self-contained breathing apparatus (SCBA) with a full facepiece operated in pressure-demand or positive-pressure mode. Structural firefighter's protective clothing will provide limited protection. If feasible and without risk, move containers from fire area. Otherwise, cool fire-exposed containers until well after fire is extinguished. Stay clear of tank ends. Use unmanned hose holder or monitor nozzles for massive cargo fires. If impossible, withdraw from area and let fire burn. Withdraw immediately in case of any tank discoloration or rising sound from venting safety device. Do not release runoff from fire control methods to sewers or waterways.

Section 5. Reactivity Data

Stability/Polymerization: Xylene is stable at room temperature in closed containers under normal storage and handling conditions. Hazardous polymerization cannot occur. Xylene is easily chlorinated, sulfonated, or nitrated. **Chemical Incompatibilities:** Incompatibilities include strong acids and oxidizers and 1,3-dichloro-5,5-dimethyl-2,4-imidazolidindione (dichlorohydrantoin). Xylene attacks some forms of plastics, rubber, and coatings. **Conditions to Avoid:** Avoid heat and ignition sources and incompatibles. **Hazardous Products of Decomposition:** Thermal oxidative decomposition of xylene can produce carbon dioxide, carbon monoxide, and various hydrocarbon products.

Section 6. Health Hazard Data

Carcinogenicity: The IARC,⁽¹⁶⁴⁾ NTP,⁽¹⁶⁹⁾ and OSHA⁽¹⁶⁴⁾ do not list xylene as a carcinogen. **Summary of Risks:** Xylene is an eye, mucous membrane, and respiratory tract irritant. Irritation starts at 200 ppm; severe breathing difficulties which may be delayed in onset can occur at high concentrations. It is a central nervous system (CNS) depressant and at high concentrations can cause coma. Kidney and liver damage can occur with xylene exposure. With prolonged or repeated cutaneous exposure, xylene produces a defatting dermatitis. Chronic toxicity is not well defined, but it is less toxic than benzene. Prior to the 1950s, benzene was often found as a contaminant of xylene and the effects attributed to xylene such as blood dyscrasias are questionable. Since the late 1950s, xylenes have been virtually benzene-free and blood dyscrasias have not been associated with xylenes. Chronic exposure to high concentrations of xylene in animal studies have demonstrated milk reversible decrease in red and white cell counts as well as increases in platelet counts.

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APPENDIX C
SITE AND HOSPITAL LOCATION MAPS

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APPENDIX E
PERSONNEL RESUMES

Albert L. Meyers, Jr.

Professional Qualifications

Mr. Meyers is a Program Manager with more than 20 years of experience in the construction and remediation industries. For the last 10 years, he has been directly responsible for supervising and managing remediation projects that have involved on-site source control, on-site treatment, the use of innovative technologies, transportation and disposal, and special applications, such as asbestos and unexploded ordnance (UXO) handling. Since the fall of 1991, Mr. Meyers has served as the Program Manager for IT's Rapid Response Contract with the U.S. Army Corps of Engineers (USACE) Omaha District. During this time, he managed the execution of 32 delivery orders. Throughout the development of the Rapid Response program within IT, Mr. Meyers has been personally responsible for training the program staff members and ensuring program continuity throughout IT's offices nationwide. Because of his professional achievements, Mr. Meyers has been named an IT Project Management Associate.

Education

B.S., Chemistry, University of Dayton, Dayton, Ohio; 1974
Safety Training (per OSHA 29CFR1910.120)

Experience and Background

1991 - ***Program Manager, IT Corporation, Cincinnati, Ohio.*** Develops and implements remedial action response efforts for hazardous waste sites nationwide. Served as Program Manager for the USACE Omaha Rapid Response Contract. Was single point of contact to the USACE. Responsible for negotiating, receiving, approving, and implementing delivery orders; designating project managers; implementing quality control and health and safety programs; attending "Report Card Meetings"; and controlling program cost and schedule in accordance with USACE procedures. Managed 32 delivery orders nationwide under this contract.

1984 - ***Field Supervisor/Project Manager, Remediation Group, IT Corporation, Pittsburgh, Pennsylvania.*** Developed work plans, schedules, and cost estimates and coordinates job implementation and execution of work. He managed or supervised on site the following jobs:

- Managed delivery orders on a cost-reimbursable basis under IT's Emergency Response Cleanup Services (ERCS) contract with the U.S. Environmental Protection Agency (EPA).
- On-site management of a major polychlorinated biphenyl (PCB) decontamination asbestos abatement at a naval power station in Guam. Activities include contract administration and negotiation as well as coordination of all decontamination removal, treatment, and disposal activities with the Navy and their inspectors.

- On-site management of Superfund/potentially responsible party (PRP) site in Indiana involving the cleaning/demolition of vertical and horizontal tanks ranging from 5,000 to 250,000 gallons. This included all interface between client and government, strict documentation, the scheduling of site activities, and all disposal/treatment.
- Supervised/managed total plant decontamination of PCB in Kentucky. Cleanup involved equipment removal/replacement, slab demolition/replacement, equipment-building decontamination, excavation, and water treatment. This project had a time constraint of two weeks, which necessitated 12-hour shifts, to complete 95 percent of the work.
- Supervised PRP project in Edison, New Jersey that involved eight hundred 55-gallon drums of unknown material, 30 tank trailers full of solvents and PCB oils, and the excavation of approximately 2,000 cubic yards of soil.
- Supervised cleanup of a large state-funded PCB/chemical dump site in New Jersey. Activities included the excavation of soils, laboratory bottles, containers, categorization, and disposal (approximately 80,000 bottles total).
- Supervised/managed the removal of USTs across the United States for a major client as well as other clients. This included attaining all necessary permits, licenses, soil and product analysis, excavation, sampling, replacement of tank when necessary, backfill with approved/clean material, disposal of waste, and compliance with all federal, state, and local regulations.
- Supervised/managed the treatment and disposal of outdated or unknown chemicals and gases at a Pittsburgh university and research facility. Many of the chemicals were unknown and warranted site hazardous categorization or site treatment due to no available disposal.
- Supervised/managed various groundwater intercept and treatment activities for major chemical and petroleum clients across the United States. Activities included treatment system design, setup, and after flow rate stabilization. The systems are self-controlled through automation, needing minor maintenance, using state-of-the-art equipment.

1982 - *Assistant Chemist/Quality Control Inspector, Schaffner Manufacturing Company,*
1983 *Pittsburgh, Pennsylvania.* Performed analyses for product development and was responsible for quality control and product development.

- 1980 - ***Field Supervisor/Project Manager, Enviro Haz Mat, Inc., Pittsburgh, Pennsylvania.***
1982 Assisted in design of basic structure of business; performed job surveys, drafted proposals, and estimated costs; and supervised and coordinated the planning, execution, and cleanup of all projects within the division.
- 1978 - ***Recovery Technician/Team Leader/Supervisor, AMO Pollution Services, Pittsburgh, Pennsylvania.*** Involved and trained in emergency response team action; assisted in preparing proposals and safety plans; and supervised various remedial projects and emergency response actions.
- 1972 - ***Mosites Construction Company, Pittsburgh, Pennsylvania.*** Laborer on all types of
1978 general construction projects; truck driver and limited equipment operator; material expeditor; crew leader and site foreman.

D R A F T

Thomas P. Mathison

Professional Qualifications

Mr. Mathison coordinates the overall activities for remediation projects including establishing and maintaining project schedules, budgets, safety requirements, and quality assurance/quality control. He has over 10 years of project management experience in the construction and development industry. Because of his professional achievements, Mr. Mathison has been named an IT Project Management Associate.

Education

M.S., Civil Engineering, Carnegie Mellon University, Pittsburgh, Pennsylvania; 1982
B.S., Civil Engineering, West Virginia University, Morgantown, West Virginia; 1981

Registrations/Certifications

Underground Utility Contractor: Florida

Experience and Background

1992 - **Project Manager, Environmental Services, Pittsburgh, Pennsylvania.** Responsible
Present for management of remediation projects, including the preparation of work plans, supervision of work teams, and control of budgets and schedules. Experience includes:

- Managing a fuel recovery and demolition project for Fire Training Facility No. 4 at Andrews Air Force Base in Washington, D.C. This project performed in conjunction with the U.S. Army Corps of Engineers (USACE) under IT's Rapid Response Contract.
- Construction management of a landfill cap project for G. E. Transportation Systems in Erie, Pennsylvania.
- Project manager for a drainline installation project at the Rocky Mountain Arsenal in Denver, Colorado. Work was performed utilizing Level B protective clothing due to the possible presence of chemical nerve agents. Project completed for the USACE under IT's Rapid Response Contract.
- Managing a soil excavation and thermal treatment project at Fort Lee, Virginia for the USACE. The project involves the on-site thermal treatment of approximately 3,000 cubic yards of petroleum contaminated soils.
- Manager for a project at Fort Eustis, Virginia involving the excavation and removal of jet fuel contaminated soil and the installation of a fuel recovery system. Also

includes the disposal of waste oil and associated tanks. Project to be completed for the USACE under IT's Rapid Response Contract.

- Manager for a project at Fort Story, Virginia involving the removal and disposal of a fire training facility and the insitu treatment of approximately 16,000 cubic yards of petroleum contaminated soils through bioremediation. The project performed for the USACE under IT's Rapid Response Contract.
- Manager for a project for Quaker State Oil Company involving the closure of a fly ash and bauxite fines landfill in Foxburg, Pennsylvania. The project included the grading of the fly ash and bauxite fines to the proper grade, placing a hope cover system and placement of two feet of soil over the site. Also included were the associated drainage systems and revegetation required.
- Manager of the immediate response project for the USACE involving the remediation of a 7,000 gallon fuel spill in Vernal, Utah. Project includes the installation of monitoring well, production wells, and the installation of a vacuum enhanced recovery and treatment system.
- Manager for a project for Quaker State Corporation in St. Louis, Missouri involving the relocation and onsite storage of radiological contaminated soils and the excavation, transportation, and disposal of approximately 30,000 cubic yards of oil contaminated soil.

1990 - **Project Manager, Pipe Power Utilities, Inc., Riviera Beach, Florida.** Responsible
1991 for the daily management and operation of a \$6 million per year underground utility contractor. Duties included marketing, contract negotiation, project administration, overseeing bid preparation and purchasing, direct supervision of the accounting department, office personnel, and field crews. Daily functions involved interaction with developers, utility companies, contractors, engineers, and government agencies with regard to contracts, change orders, pay requests, permits and general correspondence in order to ensure proper and efficient project completion. Additional responsibilities included overseeing insurance, workers compensation matters, payroll, taxes, budget control, and setting future goals and projections for the corporation.

1983 - **Project Engineer, H and T Contractors, Inc., West Palm Beach, Florida.**
1990 Responsible for the project administration of a \$15 million per year site development contractor whose projects included major earthwork for subdivisions, golf courses, underground utilities, and road construction. Duties included bid preparation, cost estimates, purchasing, contract negotiations, selection and coordination of sub contractors, preparation of pay requests, and field representations. Interacted with engineers, utility companies, government agencies, and developers in order to ensure proper project coordination and completion.

- 1983 - ***Consulting Civil Engineer, Hazen and Sawyer, P.C. Engineers, Hollywood, Florida.***
Duties included assisting in the design of water and wastewater treatment plants, sanitary landfills, and deep well injection systems. Prepared project specifications and participated in the field inspection during construction phases of these projects. Collected hazardous sludge pond samples and prepared them for shipment to be tested for compliance with E.P.A. regulations.
- 1981 - ***Research Assistant, Carnegie Mellon University, Pittsburgh, Pennsylvania.***
1983 Researched long range transport of trace metals in the atmosphere. Duties included preparation, set up, and collection of ambient air sampling systems in remote areas such as Glacier national Park in Montana and on the ice cap of Greenland. Prepared samples for analysis in a sterilized clean room laboratory and tested for metals using atomic absorption spectrophotometry. The results of the Glacier National Park research were summarized and reported in thesis which partially fulfilled the requirements for the degree of Master of Science.
- Summer 1980 ***Consulting Civil Engineer, Mackin Engineering Company, Pittsburgh, Pennsylvania.***
Assisted in the engineering for bridge inspections. Prepared sketches of existing bridges to be used during structural inspections.

A
R
D

David Lincoln Cochran

Professional Qualifications

Mr. Cochran has developed analytical and numerical models to predict the movement of contaminants in the unsaturated and saturated soil zones as well as the surface and vegetated regions. He has developed, calibrated, and validated a model that estimates water use by row crops. The model aids in sizing pumping and water retention systems to meet subsequent irrigation needs. He designed, installed, implemented, and supervised measuring and monitoring the distribution and movement of agricultural pesticides in the environment. He has set up and calibrated computer models that simulate the movement of groundwater and contaminants from Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and Resource Conservation and Recovery Act (RCRA) sites. In addition, he has used these models to test and compare the effectiveness of various barrier and recovery systems. This was used as a screening tool in selecting the most effective method and to aid in ultimately optimizing the selected remediation scenario. He is currently involved in examining field data from the environment as well as modeling the fate and transport of hazardous waste movement. Because of his professional achievements, Mr. Cochran has been named an IT Technical Associate.

Education

M.S., Agricultural Engineering, University of Georgia, Athens, Georgia; 1983

B.S., Agricultural Engineering, University of Georgia, Athens, Georgia; 1980

Continuing education:

45 hours in contaminant transport/hydrology, computer modeling, analytical/numerical methods and statistics, University of Florida, Gainesville, Florida; 1988-91

8-Hour Hazards and Protection Refresher; 1993

Registrations/Certifications

Engineer-in-Training: No. 9317

Certified Hazardous Materials Manager: No. 4405

Professional Engineer: Pennsylvania No. PE-044567-E

Experience and Background

1991 - **Engineer/Scientist, IT Corporation, Pittsburgh, Pennsylvania.** Set up (modify if necessary), calibrate, and validate contaminant transport models. Use calibrated model to study potential future contaminant movement in the environment and examine the effect various remediation scenarios have on the contaminant. Analyze and report engineering/scientific data. Plan and execute field experiments and tests for field projects. Assist in estimates and proposal preparation and report writing--all in relation to monitoring and modeling the movement of contaminants in the environment. Primary contaminant fate and transport modeler, Union Carbide Corporation, Martin

Present

Marietta Ohio site. Setup and calibrate GEOFLOW to simulate the movement of contaminants identified in the groundwater. Use the calibrated model to test the effectiveness of various groundwater remedial scenarios. Input all work into SFS report to client and agencies. As subcontractor to another office, calibrated MODFLOW to sections 1/9 of the New York City Fresh Kills Landfill. Conducted simulations, using FLOWPATH to predict the transport and capture zones of recovery wells for underground storage tank (UST) facilities.

- 1988 - *Graduate Assistant, University of Florida, Gainesville, Florida.* Emphasis in
1991 monitoring and modeling agricultural chemical transport. Research included the development of a surface/vadose zone contaminant transport model taking into account atmosphere and surface hydrologic characteristics. The design, installation, and implementation of field projects for collecting and analyzing data to aid in calibrating and validating transport models were also required.
- 1983 - *Research Engineer, University of Georgia, Coastal Plain Station, Tifton, Georgia.*
1988 Primary work was in irrigation/chemigation and tillage effect studies. This included development of stochastic models of oil-based pesticide particle distributions in irrigation systems and movement in the environment. Secondary work involved design and construction of unique equipment for use in research, such as electrical and electronic control systems and specialized sampling and analysis equipment.
- 1981 - *Research Engineer, University of Georgia, Athens, Georgia.* Primary work was to
1982 develop, test, and evaluate a computer model to predict seasonal irrigation water demands in the southeastern United States. This involved watershed scale hydrologic modeling and utilization modification of the Stanford Watershed Model. The impact of agricultural practices had on infiltration runoff and retention were a primary concern.

Professional Affiliations

Associate member, Sigma Xi, Scientific Research Society
Associate member, American Society of Agricultural Engineers

Publications

Sumner, H. R., R. B. Chalfant, and D. L. Cochran, 1990, "Influence of Chemigation Parameters on Fall Armyworm Control in Field Corn," in review for Florida Entomological FAW Symposium.

Chinnan, M. S., R. E. Fortson, D. L. Cochran, and S. R. Ghate, 1988, "Modeling Moisture Transfer in a Solid Desiccant Drying System," *Paper No. 88-6009, American Society of Agricultural Engineers*, St. Joseph, Michigan.

Cochran, D. L., H. R. Sumner, and M. C. Smith, 1988, "Effects of Irrigation Mainline Characteristics on Chemical Droplet Distribution," *American Society of Agricultural Engineers, Paper No. 88-2621*, St. Joseph, Michigan.

Cochran, D. L. and E. D. Threadgill, 1987, "Dynamic Particle Sizing: What Constitutes a Realistic Population Sample," *American Society of Agricultural Engineers, Paper No. 87-1535*, St. Joseph, Michigan.

Cochran, D. L. and E. D. Threadgill, 1986, "Injection Devices for Chemigation: Characteristics and Comparisons," *American Society of Agricultural Engineers, Paper No. 86-2587*, St. Joseph, Michigan.

Chesness, J. L., D. L. Cochran, and J. E. Hook, 1986, "Predicting Seasonal Irrigation Water Requirements on Course Textured Soils," *Transcript American Society of Agricultural Engineers, Vol. 29, No. 4*, pp. 1054-1057.

Cochran, D. L., E. D. Threadgill, and J. R. Young, 1985, "Effect of Pressure and Sprinkler Orifice Diameter on Oil-Formulated Insecticides Used in Chemigation," *American Society of Agricultural Engineers, Paper No. 85-2577*, St. Joseph, Michigan.

Cochran, D. L., E. D. Threadgill, and J. R. Young, 1984, "Use of a Center Pivot Simulator for Chemigation Research," *American Society of Agricultural Engineers, Paper No. 84-2099*, St. Joseph, Michigan.

Cochran, D. L., J. L. Chesness, and J. E. Hook, 1983, "Predicting Seasonal Irrigation Water Requirements in Humid Regions," *American Society of Agricultural Engineers, Paper No. 83-2165*.

Cochran, D. L., 1983, "Predicting Seasonal Irrigation Water Demand in the Southeastern United States," Master's thesis, University of Georgia, Athens, Georgia.

Chesness, J. L. and D. L. Cochran, 1982, "Prediction of Irrigation Water Demand in the Southeastern United States," Technical Completion Report, USDI/OWRT Project No. B-146-GA.

Steven M. Dineen

Professional Qualifications

Mr. Dineen has over 8 years of experience in conducting environmental and hydrogeologic investigation; designing and implementing remediation systems, and monitoring all phases of remediation performed at leaking underground storage tank (UST) sites. He has also conducted numerous site investigations leading to the delineation of soil and groundwater contamination due to petroleum hydrocarbon related substances. Currently, he acts as a program manager for a major oil company located in the Ohio Valley Region with an annual operational budget of \$450,000. His other duties include technical report oversight, business management, invoice tracking, project scheduling, technical staff supervision, marketing, and business development. Mr. Dineen's extensive background in petroleum hydrocarbon corrective actions has proven to be a strong benefit in managing environmental assessments and in implementing and operating of remedial actions. Four years of experience as a regulatory specialist have given him a strong background in local and state regulatory requirements regarding permitting, site assessments, and site remediation. Because of his professional achievements, Mr. Dineen has been named an IT Project Management Associate.

Education

B.S., Geology, State University of New York, Oneonta, New York; 1983

Additional training:

8-Hour Hazards and Protection Refresher Course; 1994

OSHA 40-Hour Hazardous Waste Training Course

Frontline Leadership Training, Zenger & Miller

Registrations/Certifications

Registered Professional Geologist: Pennsylvania

Experience and Background

1991 - **Project Manager/Geologist, IT Corporation, Pittsburgh, Pennsylvania.** Responsibilities include complete management of environmental projects for various clients in the petroleum and transportation industries as well as the U. S. government. Project/program management responsibilities include preparing bid proposals, providing extensive client contact, interfacing with environmental regulatory agencies, supervising project team members, taxing document quality assurance/quality control (QA/QC) measures, tracking job budgets, and preparing health and safety plans. Other duties include:

- Managing numerous projects involved with the remediation of petroleum-contaminated soils and groundwater. These projects included the design and/or the final implementation/maintenance of the following types of remedial technologies:

- Soil vapor extraction (SVE)
 - Infiltration galleries/soil washing
 - In situ/ex situ bioremediation
 - In situ/ex situ air sparging
 - Product recovery/oil water separation
 - Off-gas vapor treatment
 - Soil excavation management
 - Groundwater recovery
 - Vacuum-enhanced pumping
 - Carbon adsorption
 - Air stripping
- Participating in several emergency response projects
 - Supervising UST excavations and closure activities
 - Conducting field work activities such as monitoring well and recovery well installations, soil/groundwater sampling, monitoring, and surveying
 - Preparing work plans, site assessments, and remedial action plan reports
 - Participating in the U.S. Army Corps of Engineers (USACE) Rapid Response Program designing and implementing product recovery systems at several Army installations in the Mid-Atlantic Region
 - Conducting analysis of technical feasibility for each remedial alternative based on site hydrogeologic data, contaminants, groundwater discharge options, site logistics, and type of closure required
 - Acquiring various permits from local and state authorities to implement remedial actions
 - Being familiar with the state of Ohio, Pennsylvania, West Virginia, Michigan, and Florida regulations pertaining to UST storage tank corrective actions
 - Overseeing various SVE pilot tests, air sparging tests, aquifer pump tests/slug tests, and vacuum-enhanced pumping pilot tests.

1989 - **Project Manager/Geologist, IT Corporation, Deerfield Beach, Florida.**

1991 Field duties included monitoring and recovery well installation, soil/groundwater sampling, monitoring, surveying, percolation tests, slug and aquifer tests, tank removal oversight, and remedial system maintenance.

Other responsibilities included the development of contamination assessment reports/remedial action plans and project management of petroleum-impacted sites that were currently in remediation. Also served as the health and safety officer for the office and was responsible for overseeing employee safety training programs.

1985 - **Geologist/Environmental Specialist, Broward County Environmental Quality Control Board, Fort Lauderdale, Florida.** Responsibilities included invoking state and local regulations and policies regarding petroleum-contaminated soil and water disposal, transportation, site assessment, and remediation. Interfaced with the storage tank licensing and enforcement section to assure licensing/program compliance. Participated in the State of Florida Department of Environmental Regulations Early Detection Incentive (EDI) Reimbursement Program. Specific duties under the EDI program included:

- Maintaining a database for site management and tracking
- Overseeing initial remedial actions and emergency responses
- Providing technical reviews of contamination assessment reports and remedial action plans
- Performing field audits (compliance and quality assurance inspections) of consultants performing work in the program
- Interfacing with the major oil companies/municipalities to establish cleanup goals
- Reviewing cost submitted by consultants seeking reimbursement in the program to ensure compliance with the Cleanup Criteria Rule (CCR) as well as the reimbursement rule

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Philip M. Stearns

Professional Qualifications

Mr. Stearns is responsible for providing technical input and process and control system design for water, soil, and vapor treatment systems. His experience has focused on detailed equipment and system design and instrument specification and complimentary experience includes technical writing, treatability testing/pilot study, air dispersion modeling, system start-up, and field troubleshooting. Mr. Stearns has experience with the following types of treatment systems; wastewater and groundwater treatment, incinerator off-gas scrubbing systems, zero-liquid discharge systems, contaminated soil and sludge treatment systems, and low-temperature thermal desorption systems. He is fluent in French and conversant in Spanish and German.

Education

B.S., Chemical Engineering/Bioremedial Engineering/French, Carnegie Mellon University, Pittsburgh, Pennsylvania; 1988

One year of engineering study, Ecole Polytechnique Federale de Lausanne, Lausanne, Switzerland; 1986-87

Additional training:

8-Hour Hazards and Protection Refresher; 1994

OSHA 40-Hour Hazardous Waste Operations Training

Registrations/Certifications

Engineer-in-Training: Pennsylvania

Experience and Background

1994 - Present **Project Engineer, IT Corporation, Pittsburgh, Pennsylvania.** Provides technical input on process and control system design. Responsibilities include conceptual and detailed engineering design, specifications, system start-up, and field troubleshooting. Experience includes:

- Providing conceptual design and equipment specification for an enhanced vapor extraction/treatment system for treating contaminated soil and groundwater
- Assisting in writing a remedial action plan for a site contaminated by leaking underground storage tank (UST).
- Maintaining responsibility for equipment and instrumentation specifications and selection for a groundwater collection/treatment system
- Preparing detailed P&IDs and a detailed process control description for a groundwater collection/treatment system

- Writing an operation and maintenance manual for an in situ biological treatment system.
- 1991 - **Engineering Consultant, Self-Employed, Pittsburgh, Pennsylvania.** Provided
1994 engineering design and field services for a variety of engineering companies. Work performed included conceptual and detailed design, field work, pilot and treatability studies, project and personnel management, technical writing, cost estimating, and computer programming. Tasks included the following:
- Provided troubleshooting and start-up of a cyanide and heavy metal removal groundwater treatment system
 - Provided PLC programming for various wastewater treatment applications
 - Assisted in the design, construction, and installation of gas scrubbing systems for medical waste incinerators
 - Prepared detailed P&IDs and piping layout drawings and supervised construction of a trailer-mounted, pilot-scale bioremediation system
 - Developed and executed several treatability study test programs for carbon adsorption, ion exchange, low-temperature thermal desorption, and soil washing
 - Provided troubleshooting and system start-up of a selenium removal system for a glass manufacturing wastewater treatment facility
 - Wrote and assembled operation and maintenance manuals for a variety of treatment facilities
 - Assisted in the detailed design of regenerable vapor-phase carbon adsorption systems.
- 1990 - **Project Engineer, GMG Associates, Pittsburgh, Pennsylvania.** Responsibilities
1991 included developing P&IDs and specifications, cost estimation, field start-up and troubleshooting, developing and performing pilot and treatability studies, and technical writing. Projects involved the following:
- Developing and implementing a 4-week pilot study for a chromium remedial system. Test results were published.
 - Acting as field engineer for start-up and troubleshooting of a sludge and wastewater treatment system

- Writing a detailed operation and maintenance manual for a sludge and wastewater treatment system. Provided operator training.
 - Preparing complete instrumentation specification packages for several wastewater treatment systems.
- 1988 - *Assistant Project Engineer, Remcor, Inc., Pittsburgh, Pennsylvania.* Performed equipment design and specification, field sampling, air dispersion modeling, technical writing, field troubleshooting, and supervision and system start-up. Projects completed included:
- 1991
- Assisting in the detailed design and equipment procurement for a multimillion-dollar sludge and wastewater treatment system
 - Developing a computer program to perform detailed design of air stripping systems
 - Performing computer-based air dispersion modeling for several sites and using results of modeling in risk assessment evaluation for the sites
 - Installing underground high-density polyethylene (HDPE) piping network for wells in overburden area at a former strip mine
 - Assisting in the preparation of a feasibility study for a groundwater treatment system at a Superfund site
 - Developing and implementing detailed sampling programs for environmental assessment evaluation of several manufacturing facilities.

Professional Affiliations

American Institute of Chemical Engineers
Instrument Society of America
Air and Waste Management Association

Publications

Stearns, Philip, M., 1992, "A Pilot Study of Novel Hexavalent Chromium Removal from Chemical Film Rinse Water at General Dynamics, Fort Worth Division," with S. P. Evanoff and M. Kunka, *28th Annual Aerospace/Airline Plating and Metal Finishing Forum and Exposition*.

Dean G. Robb

Professional Qualifications

Mr. Robb is Field Operations Supervisor with extensive training and experience in hazardous waste work. He has extensive experience with drilling rigs and other heavy equipment. He has conducted environmental sampling of water soil and air. He also has extensive experience working in confined space environments in Level A and B Personal Protective Equipment (PPE). Mr. Robb also has over eleven years of experience working with heavy equipment.

Education

Electrical Engineering studies, University of Colorado at Denver; ongoing
Math and Science studies, Black Hills State College, Spearfish, S.D. 1977-1979

Additional Training:

40 hours Health and Safety Training per OSHA 29 CFR 1910.120
8 hours Health and Safety Training per OSHA 29 CFR 1910.120
Hazardous Waste Supervisor 8 hours
Excavation Safety course 8 hours
Confined Space Training Course 8 hours
PCB Training Course 8 hours
Certified Master Technician

Military Service

U.S. Navy Sea Bees, MCB5, Combat Engineer Heavy Equipment Operator; 1973-1975
South Dakota National Guard, 842ND ENG, Heavy Equipment Operator; 1975-1979

Experience and Background

1987- **Senior Field Engineering Technician, IT Corporation, Denver, Colorado.** Conduct
Present environmental sampling of hazardous waste sites, including drilling, soil sampling, groundwater sampling, air sampling, construction of groundwater remediation systems, site supervisor, health and safety coordinator, and heavy equipment operating foreman. Additionally conducts confined space entry sampling and remediation projects.

- At Rocky Flats Plant, Site Supervisor for the start and operation tests on a UV peroxide ion exchange groundwater treatment unit. Wrote the SOPs for its operation and presently training personnel for long-term operation of the unit.
- Performed groundwater sampling at Rocky Flats Plant as part of a large field sampling effort that included sampling 100 wells per month.
- For a confidential client, assisted in the design and pilot test of a SVE system to remediate xylene and toluene (primarily); performed soil gas surveys around two former gasoline station areas covering approximately four acres and included over

100 sample sites; performed confined space entry into aged hand-dug well for groundwater and vapor survey.

- Site supervisor for a groundwater collection and air stripper GAC treatment system for a pharmaceutical company's landfill designed and constructed by IT corp. Was also tasked with the oversight of the waste excavation/removal contractor. Assisted with the design, installation, and operation of a VES pilot system for the site. Assisted with the writing of the annual system report for the groundwater remediation system. This site is being highlighted by the EPA as a *remediation success* story.
- For Martin Marietta Aeronautics Group:
 - Supervised the installation of a million gallon holding pond liner
 - Supervised the demolition of an acid tank and constructed the permanent concreted cap for closure
 - Supervised the closure of four 10,000 gallon concrete sumps
 - Supervised the remediation of several PCB contaminated sites
 - Assisted in the demolition and remediation of a 100,000 gallon concrete emergency holding tank
 - Assisted in the design, construction, and operation of a pond remediation Granular Activated Carbon (GAC) unit
 - Performed several confined space entries into USTs
 - Removed and remediated several USTs
- Performed several UST removals around Colorado. The most recent was the site supervision of the removal of eleven USTs at Fitzsimons Army Medical Center.
- Fine-tuned an ultraviolet peroxide treatment system in Boulder for a pharmaceutical manufacturing company.
- Participated in the construction of a treatment facility and supervised the start-up of an air stripper remediation system in Omaha, Nebraska.
- At the Hardage-Criner site in Oklahoma, provided set-up for treatment/separator tests, participated in the design and construction of the separator system, and assisted in the construction of monitoring/recovery wells.
- Operated D-8 Caterpillar bulldozer during the remediation of Rocky Mountain Arsenal's Basin F.
- Performed remedial work on contaminated soils resulting from of a toluene spill, as well as groundwater sampling at a confidential chemical product plant in Denver.

1987-1987 **Driller/Soil Sampler, Boyles Brothers, Golden, Colorado.** Conducted drilling and well installation at hazardous waste and water well sites. Duties included drill rig operation, drill crew supervision, and sample collection for subsurface soil and geotechnical samples.

- 1987-1987 ***Pushcat Operator, Fort Union Coal Mine, Gillette, Wyoming.*** Operated pushcat in support of open pit mining operations.
- 1986-1987 ***Line Mechanic, Gram-Barth Motors, Gillette, Wyoming.*** Line mechanic responsible for repair of automobiles. Specialties included heating and air conditioning, automatic transmissions, and engine repairs.
- 1985-1986 ***Line Mechanic, J&R Motors, Gillette, Wyoming.*** Line mechanic responsible for repair of automobiles. Specialties included heating and air conditioning, automatic transmissions, and engine repairs.
- 1984-1985 ***Shop Foreman/Mechanic, D&S Casing, Gillette, Wyoming.*** Conducted supervision and maintained equipment used for drilling and casing placement.
- 1984-1984 ***Finish Blade Operator, L&M Constructors, Gillette, Wyoming.*** Operated a finish blade and constructed roads.
- 1981-1986 ***President, Operational Manager, Financial Officer, American Auger Inc., Gillette, Wyoming.*** Conducted daily business and operations. Operations included complete rathole and conductor pipe service, soil sampling, wireline coring, caisson service, and oil and gas leasing.
- 1980-1981 ***Line Mechanic, D&S Casing, Gillette, Wyoming.*** Line mechanic responsible for repair of automobiles. Specialties included heating and air conditioning, automatic transmissions, and engine repairs.
- 1970-1979 ***Field Supervisor/Sales/Heavy Equipment Operator, Robb Inc., Belle Fourche, South Dakota, and Brighton, Colorado.*** Field supervisor of construction and earth moving equipment, heavy equipment operator working in cleanup of train derailments, trucking accidents, and disposal and sales of the freight.